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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

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EDITORIAL NOTES—GAS, &c.

Centralization or Decentralization of Technical Responsibility.

An old controversial question in the gas industry that has been settled long since by an unbroken record of experience crops up again; and in, above all places, Birmingham. The retirement of Mr. Henry Hack at the age-limit of service—after an honourable career in the Corporation Gas Department, and after filling since 1902 the proud position of Engineer-in-Chief—has brought about a reversion to the condition of divided responsibility that existed before Mr. Charles Hunt's retirement in 1902. But it is a reversion in worse form—technical responsibility being now split up between the Engineers-in-Charge of no less than four different stations. True, the present change is said to be in the nature of a trial; it is spoken of by Sir Hallewell Rogers, the Chairman of the Gas Committee, as being only temporary—to ascertain how the scheme will work. Looking back over the history of the Birmingham undertaking, marking the words of Sir Hallewell that the plan of Works Engineers with Mr. Hack as Chief Engineer "has proved to the advantage of the undertaking," looking all round the country at the approved practice of all the large gas undertakings, remembering the illustrations (which can be nameless now) of lamentable effects of curbed technical responsibility and decentralization of power in that regard—the gas profession and gas administrators alike the country through may be pardoned for thinking that there had been trial sufficient even to persuade the Birmingham Gas Committee that their policy, which they are apparently hopeful will succeed, is not the correct one in the interests of the city, nor the one which does justice to the status of the Birmingham gas undertaking. We are not privy to the length of the period of probation that the Gas Committee are intending to give to the revived policy in respect of technical responsibility; but, reading between the lines of Sir Hallewell's speech (published last week), the period is to be defined by the happenings of the future. Things may go on for some time smoothly and happily; and it is to be hoped the first happening that will persuade as to the incorrectness of policy will not be of a disastrous nature or discreditable to the third largest gas undertaking of the country and the largest in the Provinces.

This question is one upon which, founded on the experience of the past, the "Journal" has always expressed decided views, both in the interests of the gas industry and of the gas profession. Therefore our attitude on this occasion is not by any means a personal one; and there would be deep regret if it could be so construed. For an undertaking of the magnitude and position of that at Birmingham, a General Manager of the commercial and financial departments and a Chief Engineer responsible for supervising and advising upon the whole of the technical work involved are not incompatible offices; and the functions of both can be very clearly defined. Nor, again, have we one word to say against the gentlemen who are the Engineers-in-Charge of the respective works; for, from observation, we can cordially and unreservedly endorse the assertion of the Chairman of the Gas Committee that they have individually "demonstrated their ability to manipulate extensive manufacturing plants, and to control large bodies of workmen." They would not have remained with Mr. Hack had they been incapables. Our objection is solely to the policy of a complete decentralization of technical responsibility, through the non-appointment of a supervisory and advisory head. Birmingham stands to-day in the undignified and impolitic position of being without a single person of technical qualification responsible for the manufacture and distribution of the gas supply, as a whole, of the city and its environs. That responsibility is scattered; and it is a deplorable mistake. And just as sincerely as we feel that, equally sincere are we in saying that it is hoped the consequences will not prove its truth.

Pertinently upon their resolution, the Committee may be asked upon whose advice they will rely on questions of works reconstruction, and as to the policy of carrying out alterations and extensions at works in the best and most economical manner possible, in the interests of the gas undertaking as a whole. Each Engineer-in-Charge may have different views of his own; each one—it is only human—will naturally work for his own hand and for personal advancement in responsibility and influence. This may be disputed. Our answer is that it has been so; and the Engineers-in-Charge of the Birmingham works will be inordinately self-sacrificing if it is not so again. Not many years since, the Corporation were in Parliament seeking to obtain powers on a site for entirely new works. They did not succeed then. The time may come when they will be in Parliament again on the same errand. Who will then be their engineering representative before a Parliamentary Committee—an Engineer-in-Charge of a single works, or a Consulting Engineer who has not had the whole system of gas supply of the city under his care and scrutiny, and knows from personal experience and daily contact its conditions and requirements in its entirety? Who is it who will watch the trend of gas engineering method and technical policy by the aid of technical training and knowledge, and counsel the Gas Committee? The Committee may seek advice from all four Engineers-in-Charge; the Committee—with all respect we say it—are not competent, as would be a supervising Engineer-in-Chief, to focus the varied engineering advice to a point that will admit of positive determination. The technical business of the gas industry is continually becoming larger and more complex; and never in the history of the industry has it been more necessary than now to tighten the technical administration by supervision under one head, and not loosen it by decentralization as is now being done in Birmingham. We repeat, the Birmingham Corporation Gas Committee are making an egregious mistake; and the unfortunate thing is that they do not realize it. Well will it be for them if they succeed in escaping a miserable tangle.

There are only two reasons that can have led the Gas Committee to favour for trial again this system of decentralization of technical responsibility—one, the saving of money; and the other that, looking round the country, their eyes may not have alighted on the man who they may think would meet their requirements, and who would be willing to leave his post for Birmingham. We cannot really conceive that the saving of money would weigh with the Corporation of Birmingham when it is the protection of the interests of the city and of the great gas undertaking that is at stake. Such a policy would be a "penny wise and pound foolish" one. We have not overlooked the fact that the Gas Committee are proposing, after trial, "to report to the Council their recommendations "as to larger salaries" for the Engineers-in-Charge. It would not harm the Gas Department to make these recommendations, and still have an Engineer-in-Chief. The larger responsibilities the Engineers-in-Charge have had imposed on them should be the subject of immediate compensation, and not a vision without present form or substance, without any defined measure of time before the vision assumes a material state, and, after all, subject to the erratic views and false economy of a certain type of councillors who are not always capable of measuring the reward due for the trained and skilled service rendered. Without the retaining influence of adequate recompense, there is not one of the Engineers-in-Charge of the Birmingham Corporation Gas-Works who would not exchange his position of divided responsibility for a chieftainship, if remuneration offered and the prospects made it worth his while. Professional advancement is not obtained by continuing longer than personal convenience makes it necessary in a position of partial responsibility. As to the second point—that the eyes of the Committee have not alighted on the man whom they may think suitable for the position of Chief Technical Officer of the

Birmingham Corporation Gas Department. Have they ever tried to find such a man? Have they advertised for applicants for the position, and given their own Engineers-in-Charge the opportunity of competing? We have no knowledge that they have done so. Until they have, they have not taken the proper steps to discover whether or not there is a man in existence competent and willing to undertake the chief technical responsibility of such a department. A strong man and a capable man is wanted—a man who can bring with him, in all his doings, that spirit of co-operation that alone can make for smooth working, efficiency, and the ultimate success of the great department controlled by the Birmingham Corporation Gas Committee, with whose present policy the life-long administrators in the gas industry, by their acts and practices, are in total disagreement.

Personal Obligations of the Worker.

EMPLOYING such a large amount of labour as the gas industry does, every parliamentary proposition affecting that labour in the present or the future must concern the industry's administrators. No apology is therefore needed for a few remarks on the Old Age Pensions Bill, the terms of which were published last week. The Bill affects employers in three ways—as rate and tax payers, in respect of the responsibilities they bear to their workers, and in regard to the economic and the moral effects of the Bill in relation to the workers themselves. The Bill as published is not the Bill that will eventually become an Act. There is too much opposition to it from the representatives of the ranks of those whom it is designed to benefit for it to do that; and it is quite likely that the measure will expand in power and application rather than contract before it is ratified by Parliament, or, if it does not expand immediately, it must only be taken as the beginning of an at present incalculable burden.

There is no doubt about this. Capital, trade, and the middle classes especially, are to be made to suffer by taxation to provide the funds for this scheme; and the necessary provision in future will be greatly in excess of the most liberal estimate of the present. The five-shilling pension is not satisfactory to leaders of organized labour; 70 years of age is too great an extreme in their eyes; and the discrimination proposed by the annual income not exceeding £26 5s., cuts very hard against the grain. There are certain to be changes in these respects, with greater drafts upon those who have to provide the money. These drafts on the sources of capital must make the provision of work for the people much more difficult in the future. Bleeding cannot continue without exhaustion. We are, however, quite at one that there should be, by capital, assisted provision for the old age of workers; and if such assisted provision can be made by finding capital for employment in industry—as in the case of those gas companies who have adopted co-partnership—so much the better.

But the negative moral and economic effects of the Bill are of the most important, through the adoption of the principle of non-contribution. As the Charity Organization Society, in a criticism of the measure, have well put the point: "If "personal responsibility can be abolished without fear of "disastrous relaxation of economic discipline, there is no "intelligible reason for confining this principle to old age." If the whole of life's obligations are to be withdrawn from the individual, and the State is to be made responsible for their discharge, "the whole training-ground on which men "have hitherto been forced to acquire habits of economic "competence is closed, and a momentous change in the dis-"cipline and education of the nation must follow." That is the point. The Bill as framed is an inducement to the casting off of thrift, and an incitement to habits of greater extravagance. Or where thrift is practised, the Bill puts upon it a limitation that will no doubt be scrupulously observed in order not to forfeit the right to an additional 5s. per week. Men whose "economic discipline" is upset by such mischievous teachings as underlie the Bill will not be such good workers as those who in the past have realized and acted up to the responsibilities of life. While agreeing completely with schemes for lightening the cares and burdens of old age without making our workers paupers, we must say that before the country is a Bill that is absolutely wrong in main principles, design, and intention, and, *ergo*, in effects. It is a Bill that was drafted in a hurry, and with a pious hope that it would please the workers of the country as an earnest of the continued generosity of the Government to them. But it has not pleased them. It has missed its mark, and pleases no one, except the sheep in the ministerial flock, if we receive their professions as a true exposure of their inner feelings and personal opinions.

Mr. Newbigging: His Reason.

AMONG the admirable qualities possessed by our venerated friend Mr. Thomas Newbigging is that he has the courage of his convictions. No matter what may be the ascendant opinion in contemporary gas professionalism, if Mr. Newbigging disagrees, he says so, and gives his reasons. We honour the man with reasons for his opinions. There are many who express opinions, but do not advance reasons in support; and those are, as a rule, the men whose personal convictions on the point in question are shallow, and even perhaps without foundation, or who are unprepared to have the value of their opinions thoroughly analyzed. The latest matter upon which Mr. Newbigging has been addressing his fellow members of the gas profession, through the Manchester Institution, has been low illuminating power gas; and his object has been to issue a word of caution against precipitate reductions of illuminating power, and against dropping to the very low standards of which there has been talk, but to which few have yet attained. We, too, are favourably inclined to gradual reductions of illuminating power, but are not in favour of putting the lower range of illuminating power at the point which Mr. Newbigging regards as the one at which to rest content. His views on this point would find scanty endorsement in the South of England, where, without enrichment, it was found impossible, in the "London" No. 1 argand days, to maintain 16-candle power, and at the same time supply gas at moderate prices to the consumers. Going North, and to beyond the Border, there has no doubt been ebullient satisfaction, since the publication of Mr. Newbigging's paper in February, that high-power gas had such a doughty and eminent champion; but the reply of Mr. Newbigging to the discussion on the paper last Saturday week will have caused that satisfaction to dissipate very rapidly, as it is now found that Mr. Newbigging has no higher notions for a good all-round quality of gas than 16-candles!

So far, so good. Having discovered what Mr. Newbigging regards as a fair low-water mark for illuminating power, the next duty is to examine his reasons for not descending somewhat lower. They are that the majority of consumers have not yet adopted incandescent gas-burners, that there is no early prospect of these burners becoming universal, and that there ought not to be "coercion" or "premature compul-"sion," through, it may be supposed, the adoption of a low illuminating power standard. While talking of coercion and premature compulsion, Mr. Newbigging confesses that much of the backwardness to reap the benefit of the "marvellous "efficiency and economy," of the incandescent gas-burner is "due to rank ignorance." This is written twenty years after incandescent gas lighting has been among us as a marvellously efficient and economical agent for illuminating purposes. Considering this, and what Mr. Newbigging himself says, it is clear that rank ignorance, still being existent, requires something more than a condescending abstention from act on its account; and whatever the act is, providing it is not so drastic that it is against the interests of all other consumers, then we should not pronounce it "coercion" or —at this time of day—"premature compulsion." It is impossible in any consideration of the question of low illuminating power gas to argue nowadays that its adoption must depend solely upon the prevalence of incandescent gas lighting. The conventionality in gas supply of the days when gas was used almost wholly for illuminating purposes, will not suit the present, when such a considerable proportion is used for cooking, heating, power, and in industrial operation.

This, in our opinion, is where Mr. Newbigging takes a narrow view of this subject of low illuminating power—in making the universal application of the incandescent system the sole condition permitting of the lower illuminating power. In entire accord are we with the President (Mr. Tim Duxbury), Mr. Samuel Glover, Mr. J. H. Brearley, Mr. W. Whatmough, and Mr. H. Kendrick, that incandescent lighting is being used by a larger percentage of consumers to-day than Mr. Newbigging is confessedly aware of; and there is no cause for doubt that the widespread knowledge now of what can be, and is being done, by incandescent gas lighting as compared with flat-flame burners, is of the greatest enabling assistance to the gas maker in taking steps to obtain authority

to reduce his illuminating power to a point that will allow him to get from his coal the largest amount of gas of good combustible and heating qualities, without the necessity of adventitious enrichment. If such gas reduces the illuminating effects of the flat-flame burner, there is not such "rank ignorance" abroad now that consumers do not know, and can see all round them by comparison, that there are means to their hand by which they can realize the advantages of greater illumination than from flat flames with the lower illuminating power and lower priced gas. "Proved virtue will flourish." In many of the towns in Germany—Berlin, for example—illuminating power is a secondary and even ignored consideration. The gas makers of that city strive to turn out, and succeed in turning out, a gas of fairly uniform calorific power; and the testimony from several quarters is that to-day it is difficult to find in Berlin a flat-flame burner in use for the general purpose of illumination. Notwithstanding this rejection of consideration for illuminating power, the new and extensive gas-works at Mariendorf of the Imperial Continental Gas Association, and the Tegel works of the Berlin Municipality, are the monuments to the commercial progress of gas supply in the city. We fully believe that the surviving memories and influences of the flat-flame burner and rich gas—the dirty ceilings, and the poor illumination for the quantity of gas consumed and paid for—have been, and still are (in lessened degree we hope), of advantage to our electrical competitors. The extermination of the flat-flame burner, by all means, including the appointment of an amiable and persuasive inspector, should undoubtedly be the aim of the gas maker.

But it is our contention that the consideration of this question of low illuminating power gas ought not really to be judged from the standpoint of the flat-flame consumer. An investigation some time back in South London (our recollection will be corrected if wrong) showed, in representative districts, that about 80 per cent. of the gas consumed was used for purposes other than for flat-flame lighting. There is the strongest possible objection to this 80 per cent. being in any way sacrified to the 20 per cent., or, in other words, being immolated on the alter of "rank ignorance." There is, if anything, a lower percentage of complaints now, with the incandescent burner and lower power gas, than there was before with richer gas and open flame burners; and experience puts one in thorough accord with Mr. Glover that "from the richest gas there are the most complaints." Research assures us that high illuminating power is positively injurious to all users of gas other perhaps than the flat-flame consumer; that the highest heat efficiency with atmospheric flames is obtained with combustible gas of, within limits, low illuminating power. If combustible gas is supplied, undiluted to the smallest possible extent with that which has no value for heating purposes, if its constitution is maintained fairly uniform, that is the gas for to-day. The incandescent burner marks progress; it is still progressing. It is a drag on such benefical progress if that which is auxiliary to it, if that which is its (so to speak) natural corollary, is forcibly withheld from it, and by above all tyrannical masters that named "rank ignorance." From all points of consideration, we cannot accept Mr. Newbigging's reason for cautioning against a lower illuminating power than 16 candles as sufficiently cogent or conclusive, nor can we make the universal application of the incandescent gas-burner the condition precedent to the adoption of the policy of lower illuminating power gas. In the gas industry to-day, we must all look forward. We must not look back; nor must we deliberately circumscribe our view.

The Testing Privileges of Brentford.

It will be remembered that in January last, the Chiswick District Council, before the Acton Magistrates, secured the conviction of the Brentford Gas Company, for supplying gas of alleged deficient illuminating power on tests made at a testing-station that was not a statutory test-place and by a Sugg-Letheby burner. It was a sort of metaphysical problem that was involved in the case; and it was what did Parliament intend when they loosely prescribed in 1868 that the Company's gas should be tested by a fifteen-hole argand burner, using a 7-inch chimney and consuming 5 cubic feet of gas. The Chiswick Council and their supporters looked back through the years, and held that Parliament intended that the Company should be chained to the argand burner as made at that day; but the Company contended that the very general conditions imposed upon them in regard to the test-burner (it could not be called a standard) were indicative of a considerate Parliament not wishing to bar them from any improvements, so long as the burners answered to the one condition as to fifteen holes, and that the two conditions of use—7-inch chimney and 5 cubic feet consumption—were complied with. The Magistrates at Acton, with no more knowledge probably of things photometrical than Parliament had in 1868, agreed with the contention of the local Council. As was shown by us on Jan. 28 last, there were at least four burners existing in 1868 which complied with the description specified in the Company's Act. This being so, it is a reasonable inference—and so the Lord Chief Justice and Justices Darling and Sutton think—that had Parliament intended that the Company should be tied to any one particular burner, they would have specified which one; but, not doing so, and only prescribing a burner in general terms and not in definite detail, it was their intention that the Company should not be denied the advantage of improvement upon the crudity of burner and vagueness of knowledge of the subject that existed at the time. The Company are therefore now quite at liberty to ask that their gas should be tested by any argand burner complying with the three terms of the Act of 1868; and they are in reality now in a freer position than those Companies who are working under the modern testing clause. For such Companies cannot change from the burner specified without the approval of the powers that be; while the Brentford Company can demand that their gas shall be tested by the latest improvement in argand burners made to satisfy the requirements of their Act. The conviction of the Company has been quashed; and they may be congratulated upon having established for themselves a unique position through the survival of a piece of legislative antiquity. Until now the Company themselves could not have been altogether certain that they were the possessors of such liberty in the matter of testing.

Councillor Duxbury and Gas Profits.

Once more the question of the disposal of gas profits has been introduced by Councillor Duxbury in the Darwen Town Council; but again his cogent reasoning has failed to impress the majority of the members. Or possibly it would be more correct to say he has again failed to induce a majority of the members to vote with him; for he expressed his belief that most of them were convinced he was right, but year by year they kept voting the money wrongfully because other Committees needed assistance. Mr. Duxbury may well be correct in his view that some of the members of the Town Council on this one question have not the courage of their convictions. In fact, it is really difficult to understand, on broad principles, how it can be regarded as fair for a gas undertaking's profits to be used for the bolstering up of a competitor in the shape of electricity—which seems to be just what the Darwen Corporation are doing. From Mr. Duxbury's last speech, some notice of which appears elsewhere, it would seem that this year £2000 has been transferred from the gas profits to make good the losses on the electricity undertaking, which is clearly unfair to the gas consumers; and besides this, if carried to extreme limits, it might have serious results for the Gas Department. Supposing that by selling current at less than cost price (as Mr. Duxbury asserts is done) the bulk of the gas consumers were induced to patronize electricity, where would be the gas profits then? Darwen is, it may be remarked, not the only place where the idea of making good the losses of one municipal undertaking out of the profits of another finds favour; and however much objection there may be to it in a case where the concerns happen to be (say) gas and water, or electric lighting and tramways, there is certainly still less to be urged on its behalf when the undertakings involved are competitive systems of illumination and power. There is no doubt at all that in every instance the proper method is to make each tub stand on its own bottom, if justice is to be done to all parties; and this is particularly the case where a man using one form of light, heat, or power would otherwise be assisting to supply another person with a different agent for securing the same services at a less price than he would, without such help, be forced to pay. The smaller the output of gas, the higher in any event would be the price that would have to be charged for it; and so those who are induced to use electricity owing to the cost of it being partly met out of gas profits, are doubly injuring the consumers of the older (and better) system—first, by increasing the cost of the production of gas by reducing the

output owing to the withholding of their custom, and, secondly, through the subsidizing of their chosen commodity by those who do remain consumers of gas. Mr. Duxbury is of opinion that a Gas Consumers' Protection Association would do good work. In Darwen—and, for the matter of that, in other places similarly situated, where there happened to be so energetic a worker as he is to aid it—this might be so. At any rate, the suggestion seems worth acting upon; for if it did not do good, it would certainly do no harm. The advantages of a cheap gas supply are, however, so manifest that the efforts of such an Association really should not be needed to secure them.

Motor Omnibuses and Lamp-Posts.

We are pleased to see that the City of London Electric Light Company are not disposed to let the decision of Mr. Justice Ridley and a Special Jury stand unchallenged, regarding the liability of motor 'bus companies for damage done to street lamps and columns. The case was referred to in our pages on April 28, p. 208. According to the dictum of the Lower Court, these motor 'buses may skid along roads, and knock down lamp-posts; but, if there is not proved negligent driving, the owners of the lamp-posts cannot recover from the owner of the motor 'bus the damage done. The result of this decision was that the City of London Electric Lighting Company could only recover in one case out of two which they had brought before the Court. The judgment was contrary to the practice of the County Courts in awarding damages for the harm done by motor 'buses to lamp standards, and, it seems to us, altogether contrary to reason. But there is, we think, little chance of the decision standing. As the result of argument in the Court of Appeal, direction has issued for a new trial of the whole action, on the grounds that it is not clear what the Jury meant by their verdict, and that there was not a satisfactory trial. There will be interest for the owners of public lamps in the result, which it is to be hoped will establish their right to damages.

The Reports of Municipal Undertakings.

The present issue contains references to another batch of municipal gas undertaking results for the past financial year; and again they are of a highly satisfactory character. A net profit of £49,110 is reported at Leeds; and after deduction of redemption fund charges, the surplus available for the relief of the rates is £14,708. The purchase of coal fairly well ahead at the beginning of the year, saved a large amount of money. When coal was at its lowest, an eighteen months' supply was bought instead of the usual twelve months. The total gas made at Wigan (8½ per cent. more than the previous year), and also the make per ton, show a satisfactory increase; and the growth of the slot-meter consumption is well maintained—the receipts from this source having been £8537. With this large business, it is reported that ten boxes were broken during the year, the money in nearly every case being recovered from the consumers. An increase of somewhere about 7 per cent. in the quantity of gas made is recorded at St. Helens; the number of new meters fixed during the year having been close upon a thousand. About 43 tons of copper coins are stated to have been brought in by prepayment meter collectors; no less than £20,281 out of the £48,552 received for gas having been from this class of consumer. A satisfactory increase in the quantity of gas sold is reported from Stafford; and an interesting feature here is the profit-sharing among the employees. On this occasion, a bonus representing nearly 9 per cent. of the wages is to be paid to the clerks and workmen in the Gas Department, and one amounting to 7¼ per cent. to employees in the Electricity Department. A sum of £3500 is to be handed over in relief of the rates at Lincoln; and gas-cooker rents are to be abolished for the six winter months. It is anticipated that there will be a substantial saving by people who now have their cookers removed at the end of the summer keeping them in position all the year round; and finding them at hand, they may—as the Chairman of the Committee remarked—be tempted to make use of them even in the cold weather. Lancaster shows an increase of 4·27 per cent. in the quantity of gas sold and used at the works and offices. The cost of fuel and wages has been further reduced by the installations of stoking machinery and coke-conveyor, together with alterations to the furnaces. At Fenton, the price of gas has been reduced, and a small profit of £600 has been realized, which is as it should be; and as the Council have done everything that will be required for some years, and have a plant capable of producing something like 50 per cent. more gas than is now needed, this profit has very fairly been handed over to the Finance Committee. At Coventry, more gas was sold; and the continued popularity of the prepayment system was demonstrated by the increased revenue under this head. A sum of £3000 is to be handed over in aid of the rates; and £6000 is to be set aside to meet loss of capital on abandonment of plant at the old works. The consumption at Newbury has gone up from 57 to 60 million cubic feet. The whole of the £1385 profit is to be expended in improving the condition of the works.

The "Electrician" on the Franco-British Exhibition.

The "Electrician" is jubilant. It quotes with a considerable amount of relish our remarks from the "JOURNAL" for May 19 as to the large representation that electricity has in the lighting of the Franco-British Exhibition. But our contemporary ascribes to "electrical engineers" the credit for this. "In a previous article we referred" (says the "Electrician") "to the great opportunity offered by this exhibition to electrical engineers for making an effective display of decorative illumination; and we are pleased to see they have not missed this chance of outshining their competitors." Mr. Imre Kiralfy may object to this purloining of an honour (if so it can be called) that may be due to him for his selection of decorative illumination for a large part of the exhibition, and the giving of it to electrical engineers. Why it is upon record that the estimate for the cost of electricity alone for the exhibition during the six months that it will be open is about £40,000—the guaranteed minimum payment being no less than £10,000. For the former sum a gas-works contractor would have been prepared to put down a whole gas-works in one corner of the grounds for Mr. Kiralfy for his perpetual use; and he could have got all the gas he would have required for the six months, and have been something in pocket. Our contemporary may be referred to a plan we gave last week showing the location of the high-pressure gas-lights in the exhibition grounds; and it will make apparent that it is not an inconsiderable part of the grounds that is so lighted. Consider this, too, that each of these lamps is giving a light of 1500 candles, using only 25 cubic feet of gas an hour each. The whole of the 230 lamps therefore are only consuming 5750 cubic feet of gas per hour. Supposing the Exhibition authorities are paying 2s. 9d. per 1000 cubic feet for the gas, the cost of the gas for the lighting of this considerable part of the grounds amounts to less than 16s. per hour; and the well distributed illumination amounts in the aggregate to 345,000 candles. Mantle replacements only average about five per day. What thinks the "Electrician" of these figures?

Impressions and Facts.

"No wonder," says our contemporary, still allowing its jubilancy to override commonplace facts, "that visitors depart from the exhibition with the impression that gas is non-existent." The impression does not last long; the visitors do not get far from the exhibition—even if they do not go in to the gas-lighted parts of the grounds, or penetrate into the Machinery Hall—to find that gas is anything but non-existent; and a large percentage of the people visiting the exhibition will day by day be very thankful that cheap and excellent gas lighting awaits their home-coming. It is merely the covetous wish of the electrician rather than the "impression" of any sane person that gas is non-existent. When "electrical engineers" were doing so much in making an "effective display of decorative illumination" (we are glad the adjective is not applied to any other form of electric lighting in the exhibition), we wonder what gave certain electrical papers and the engineers of the London Electricity Supply Companies such a fright over the suite of rooms the Gas Section Committee were putting up. From the "Electrical Review," we understand that the electricity supply has been duplicated throughout the exhibition—all the important buildings and lighting "throughout" the grounds being arranged with alternate sections of lamps or alternate lamps fed from separate sources. Why was such a precaution necessary? The answer of the "Review" is "in view of the fact that the installation is almost of a permanent character, and intended to deal with a maximum of 3000 kilowatts." We are disappointed. We expected to read that the precaution was necessary for the safety of the public.

NOTES FROM WESTMINSTER.

THERE is not much to be said to clear up the history of the session's work in the Committee rooms to the point of the Whitsun adjournment. The Committee of the House of Lords with the London and District Electricity Bills in hand have been ploughing through the evidence for, and in opposition to, giving the power and bulk supply over to a new and separate Company; and now they are to have a rest until June 16. To the same date, the Daylight Savings Bill Committee have relaxed their consideration of the benefits of utilizing more daylight and less of the artificial kinds. They had a sitting last Tuesday; and Sir William Ramsay was among the witnesses. He is convinced that the measure, if passed, is going to have another saving effect, and that is on eyesight. We have heard of bank clerks and others who have to spend hours at close work under electric light complain of the wearying and wearing effect on their eyes. The Committee are anxious to get more of the views of opponents to the Bill; but with all the efforts that are made to find out something as to hostility, no one can be got to come forward. The fact of the matter is that no one can advance any real objection to a greater use of daylight, nor say anything against the advantages of so doing. It is a natural thing to live in Nature's light. The Port of London Bill Committee (with Mr. Russell Rea in the chair) have had a preliminary meeting, and have received the appearances against the measure. These are formidable in number—being no less than sixty. Local authorities, dock companies, conservators, railway companies, shipowners, traders, and others are in the swim. The gas industry is represented by the Gaslight and Coke, the South Metropolitan, the Commercial, the South Suburban, and the Wandsworth and Putney Gas Companies. Water supply is represented by the Metropolitan Water Board; and it is remarked that the London Waterside Manufacturers' Association, of which Sir George Livesey is Chairman, are also among the opponents.

Miscellaneous.

Water Schemes. If a Parliamentary Committee were ever glad they have come to the end of their labours over a Bill, that Committee must be Mr. T. W. Nussey's. The measure upon which they have been engaged has been that of the Pontypridd Water Company; the hearing of which, through the big opposing force, has been of most tedious length. But Thursday saw the end, though, seeing that they required no less than two hours for the consideration of their decision, the difficulties of the Committee were even then apparently great. However, they have declared the preamble of the Bill proved, but it will need diligent application on the part of the promoters to fully appreciate the mass of conditions affixed to the decision. Among them are these: If there is to be a sterilization clause, it is to be adopted and incorporated in the Act on the basis of the cost price of the works of construction. The Committee think that the proposed new reservoir should be made of the maximum size. With regard to charges, the Committee granted 75 per cent. of the total of the increased charges asked for. The Company are to be entitled to 50 per cent. within twelve months after entering on their contract for the reservoir, subject to the certificate of the Board of Trade, after they have substantially commenced their works, and the balance on completion of their works, subject again to a Board of Trade certificate. The charges for baths, &c., are not to be increased; and the ordinary charges are to be revised on the completion of the works, and then every seven years. With regard to the opposition of Mountain Ash, the Committee think the Council should have the right to demand any surplus water from the Company, subject to a price to be agreed upon, and put into the Bill. Regarding the opposition of Llantrisant, the Company are to be put under the obligation to supply the area sought to be included in the Bill without any guarantee. The Committee think the matter of filtration urgent, but that a time-limit should be imposed upon the Company to complete their filtration scheme. The works must be commenced within two years after the passing of the Act; otherwise the powers under the Act are to lapse. Clauses are to be considered on June 17. Passing to other Water Bills, the House of Lords Committee (with Lord Ludlow as Chairman) who considered the Ammanford Water Bill, had before them an alternative scheme proposing a Water Board for the Llanelly rural district and the Burry Port urban district. This latter scheme was thrown out; and, as announced last week, the Committee, in connection with the Ammanford Bill, merely legalized the part of it relating to existing works, but refused the proposals as to new works.

Manchester and District Junior Gas Association.—On Saturday, the 27th inst., the members of this Association will visit, by invitation, the iron-works of the Staveley Coal and Iron Company, Limited, near Chesterfield. At the close of the inspection, luncheon will be provided by the firm.

The Chairmanship of the Metropolitan Water Board.—It was recently mentioned in the "JOURNAL" (*ante*, p. 516) that Sir Melvill Beachcroft had resigned the chairmanship of the Metropolitan Water Board. At a special meeting of the Board on the 29th ult., Mr. E. B. Barnard, M.P., the Vice-Chairman, was unanimously chosen as his successor. Mr. Barnard has for some time been Chairman of the Works and Stores Committee of the Board.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 653.)

SHORT as was the week just closed on the Stock Exchange—for the "House" was shut on Saturday—and, moreover, handicapped by the advent of the Whitsuntide holidays and the attractions of the Epsom Summer Meeting, it still contrived to be interesting and instructive. For in a brief space of time it showed how sharply and quickly the pendulum of prices can oscillate. The opening was as cheerful as could be, full of the influences that brightened the close of the week before. Every market was brisk and buoyant; and even the American stood firmer. The gilt-edged division led the way, and Consols rose ½. Tuesday began in the same vein, and for some time prices went up like Hurlingham balloons. But the pace was too sharp to last, and then a check set in. The general move now was to realize profits on the sharp advance; and things came down accordingly. Consols were $\frac{1}{16}$ lower on balance. Home Rails followed in sympathy, and the rise in the rest was stayed. Business became much quieter on Wednesday, realizing continued, and Rails of all sorts felt it sharply. But the gilt-edged division took a quick turn the other way; and Consols actually rose $\frac{5}{8}$. Next day the pendulum was swinging back again, and Consols lost $\frac{3}{16}$ of the gain. The tendency continued easier; but business fell very quiet up to the close. In the Money Market, the situation became steadily easier, until at last money could be had from day to day at almost nominal rates. For discount, also, rates continued to relax. In the Gas Market business was on a very good scale, all circumstances considered, and the tendency was decidedly favourable; some important lines advancing their quotations. Foremost among these was Gaslight and Coke ordinary, which opened with dealings at 94, but soon added a couple of points to this, and closed at 95-96. The secured issues, too, were stronger; the maximum marking 88½ and 89⅝, the preference 108½ special, and the debenture 84¼. South Metropolitan was fairly brisk at rather better figures; transactions ranging from 118½ to 119½. The debenture was done at 86. In Commercials, the 4 per cent. marked from 106¾ to 108, and the 3½ per cent. 102¼. In the Suburban and Provincial group, Brentford old changed hands at 241 free, British at 41¾, and West Ham at 101⅜. The Continental Companies were firm, with Imperial done at from 178 to 181, Union at 117 and 118, ditto preference at 143½, European fully-paid at from 23¼ to 23¾, and ditto part-paid at 17. Among the undertakings of the remoter world, Bombay was done at 6, Hong Kong at 18½, Melbourne 4½ per cent. at 101, Primitiva at 5½, ditto preference at $4\frac{15}{16}$, ditto debenture at 92¾ *ex div.*, and River Plate at 12¾ and 12⅞.

OBITUARY.

Mr. JOHN GAMON, whose name has long been familiar to "JOURNAL" readers through his having occupied the position of Chairman of the Chester Gas Company, died last Wednesday, in his seventieth year. He became a Director in 1878, and was appointed Chairman in 1894. During Mr. Gamon's chairmanship the business of the Company has grown enormously. Comparing last year with the time Mr. Gamon became Chairman, the sales were 231 million cubic feet, as against 101 millions (and this in spite of the use of electric light). Chester was one of the first towns in which the Gas Company adopted a system of profit-sharing and a pension scheme. This scheme was worked out by Mr. Gamon, as Chairman, and Mr. F. A. Pye, as Secretary and Manager, with the assistance of Sir George Livesey. On June 30, 1907, the sum of £854 was standing to the credit of the profit-sharers, in addition to £270 of ordinary stock purchased by them since the commencement of the scheme six years ago. Last birthday, Mr. Gamon received from the profit-sharers a much-prized token of appreciation of his work on their behalf, in the shape of a silver salver.

Mrs. and Miss Carlow desire to express their sincere thanks for the many kind expressions of sympathy received during their recent sad bereavement.

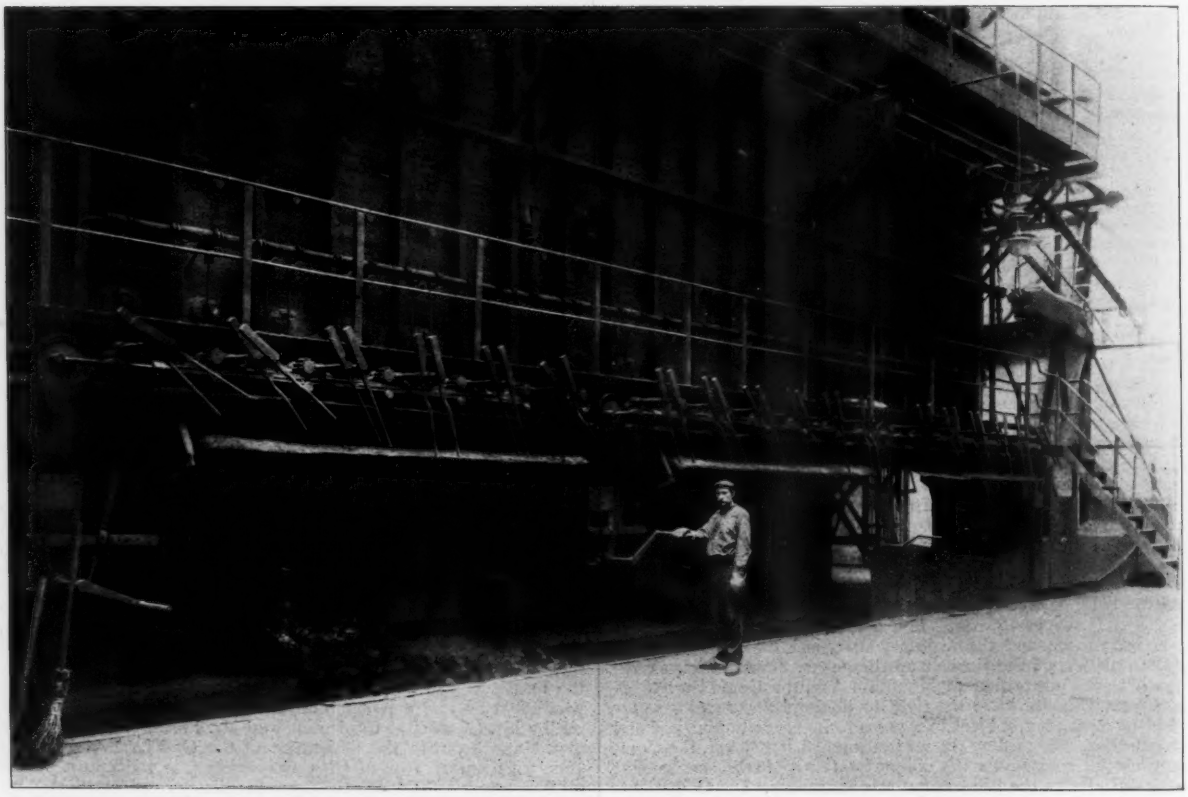
In a previous issue of the "JOURNAL" (see *ante*, p. 505) brief reference was made to M. Meunier's contributions to the "Comptes Rendus" on this subject. According to an abstract of one of them by Mr. F. Sodn, which appears in the current number of the "Journal of the Society of Chemical Industry," the author, in order to explain the fact that an incandescent body, such as a gas-mantle, is at a higher temperature than the surrounding flame, supposes that oxygen is energetically attracted to the body, which therefore becomes the seat of local combustion in almost pure oxygen. Each particle of carbon, for instance, in an ordinary luminous gas-flame may be looked upon as becoming a centre of combustion, by surrounding itself with an atmosphere of oxygen. Combustion by incandescence lowers considerably the inferior limit of inflammability of a gas, for it is found that when a feebly incandescent Auer mantle is exposed to a jet of air containing only 5 per cent. of coal gas (10 per cent. is the inferior limit of inflammability), there is a marked increase of incandescence, though a jet of pure air produces, on the contrary, a dark band on the part of the mantle affected by it.

THE VISIT OF BRITISH GAS ENGINEERS TO BERLIN.

[Photographs of the Tegel Works of the Berlin Municipality will appear next week.]

THOSE British gas engineers who have now resolved to visit Berlin at the conclusion of the technical meetings of the Institution of Gas Engineers—that is to say, leaving London on the evening of Thursday, the 18th inst.—may be sure of this, that in the capital city of Berlin they will receive a hearty welcome from all their German professional colleagues. The programme arranged for them is an inviting one. The hospitality of their hosts, and the opportunity that it will afford of making and ripening friendship, will be, as many of us know from experience, displayed with a warmth of feeling that will make the visit memorable. The programme has already been sketched in our columns; and, technically, the central features of interest will be—quite naturally—that which is newest to British gas engineers. And that which our German colleagues have to show which is novel to most British gas engineers are vertical retort-settings as arranged and worked on the system devised and developed in Dessau and Berlin. It will therefore excite anticipation and pleasure to see photographic views of some of the actual installations that will be visited. The work of developing the vertical retort from the 4-metre to the 5-metre length was carried on to a successful issue at the small Oberspree station of the Imperial Continental Gas Association; and for that reason, and to inspect the final results of the work there, the gas engineer will contemplate with pleasure his visit to that station. There the hard fights with almost disheartening difficulties were waged by Herr E. Körting and his willing coadjutors—the members of his staff—in taking the work accomplished at Dessau one step, or one metre, further.

From Oberspree, the visitors will journey to the Mariendorf works—Mariendorf the conception of the late distinguished Gas Engineer, Mr. Edward Drory, whose writings and descriptions of these magnificent works have enriched the pages of the "JOURNAL," and will be well worth reading by intending visitors.* Casting the mind back, it is remembered how Mr. Drory in 1902 entered into the controversy that was proceeding in these columns on the relative costs of retort-house working with inclineds and horizontals, before the machinery for the latter had reached its present-day perfection. In the article then contributed, he introduced for the first time figures as to the working of the inclined retorts at Mariendorf. In the same year, there was a fascinating article from him, recounting his experiments to arrive at the most suitable type of house for inclined retort-settings; and



Front Part of Furnace, Showing the Discharge of Coke, at the Oberspree (Berlin) Gas-Works.

visitors will get from that article the reasons that influenced the retort-house construction (Nos. 1 and 2 houses) at Mariendorf. Two years later came the valuable series of descriptive articles on the Mariendorf works, in the preparation of which Mr. Drory had as associates Herr Körting (Engineer) and Herr H. Schüller (clerk of the works). This series of articles will be found extremely valuable at the present time. The work Mr. Drory commenced at Mariendorf is being prosecuted, along lines that would have gratified the desires of the technical founder of the works had he been spared, by his (former) assistant and successor, Herr Körting. At Mariendorf, will be inspected the system of 5-metre vertical retorts, constructed to the degree of perfection that the developing work at Oberspree produced—in other words, the Mariendorf installation is the sequel to Oberspree. The vertical settings there are, in fact, on a scale worthy of the magnificent works. The article Herr Körting contributed to the "JOURNAL" on Jan. 14 last, and which has attracted considerable attention, commenced with the words: "At the Mariendorf works, the new vertical furnaces, with 84 retorts, equal to about 1,225,000 cubic feet of gas per day, have been in action now for some time." That is not all. In the report that the Directors of the Imperial Continental Gas Association presented at the last meeting of the proprietors—about a month since—it was stated that preparations had been made for the erection of thirteen additional settings on the vertical system. This is all indicative of a settled conviction in Berlin as to the supremacy of the vertical system over the horizontal and inclined settings which were developed to such perfection at the works in that city, before the vertical retort came and brought with it fascination, and results that Herr Körting has submitted in the aforesaid article are, taken all in all, of a value exceeding those obtained by the best of antecedent systems of carbonization. That article (see "JOURNAL" for Jan. 14 last) should also be perused by visitors, to prepare them for a critical examination of the settings from which the results as set forth are obtained.†

To turn now to the photographs giving views of what will be actually seen at Oberspree and Mariendorf in connection with the vertical settings. In the first picture, we have a view of the front of the vertical settings at Oberspree. Those engineers who have been accustomed to seeing, from their youth up, retort-settings with mouthpieces fore and behind, will, by studying the photographs, be relieved of any shock on being brought *vis-à-vis* with retort-settings with sheer walls and devoid of the ordinary

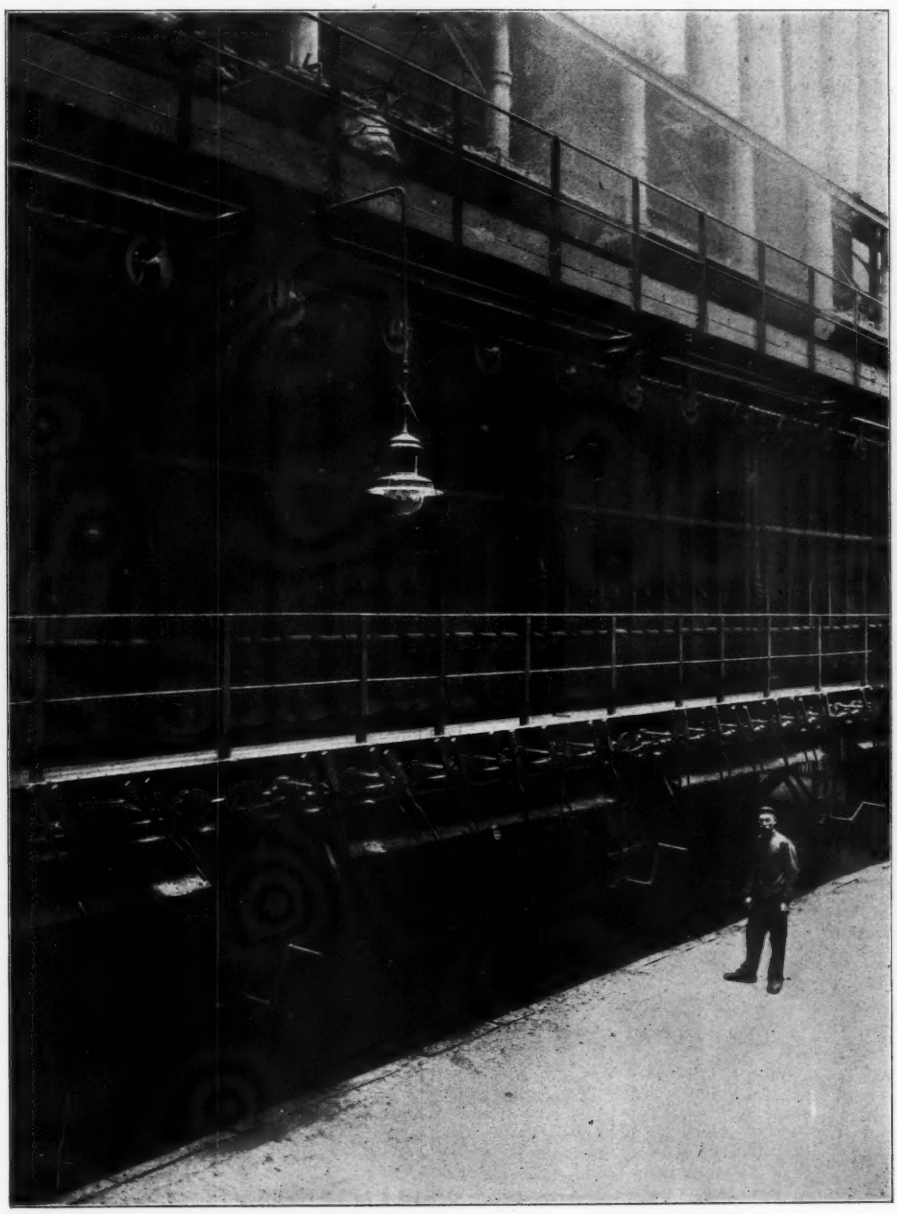
* See "JOURNAL," Vols. LXXIX., pp. 478, 1483; LXXXV., pp. 469, 619, 686, 752, 829.

† Other articles and papers dealing with Herr Körting's work in connection with the vertical retort system will be found in "JOURNAL" volumes as follows: Vol. XCIII., p. 342; Vol. XCIV., pp. 25, 97, 230, 879; Vol. CI., pp. 93, 683.

trappings of the retort-bench. The first photograph also shows the coke flowing from one of the retorts. The second picture is a companion to the first. It is really the same view; but it depicts more clearly and particularly the mechanical arrangements for manipulating the bottom doors. The mechanism is very simple; and equally so is its operation. Whether we look at the front of the settings, or go on top, the whole is an example of absolute simplicity of construction for carbonizing. We have in the next photograph a view on top of the bench; and the arrangements for charging the retorts will be observed. The superstructure required for dealing with these retorts is not by any means of so heavy a character as might be supposed. The fourth picture shows the clinkering-doors at the back of the Oberspree furnaces. The photographs suggest the smallness of the amount of manual labour required, cleanliness, airiness, and simplicity. The visit will corroborate the pictorial tale of the photographs.

The three small photographs are of the settings at Mariendorf. They are somewhat out of proportion to those of the smaller installation at Oberspree; but the difference is due to the circumstance of photographic availability. The difference in the size of the pictures must not, therefore, be taken as any criterion of relative importance. It is really the contrary. There is a view of the framework of the Mariendorf No. 3 house during construction, and that has been specially designed for accommodating 28 settings of vertical retorts, of an aggregate daily capacity of 5 million cubic feet. There is also a view of the vertical settings in course of construction; and another of the back of some of the furnaces, showing the clinkering-doors.

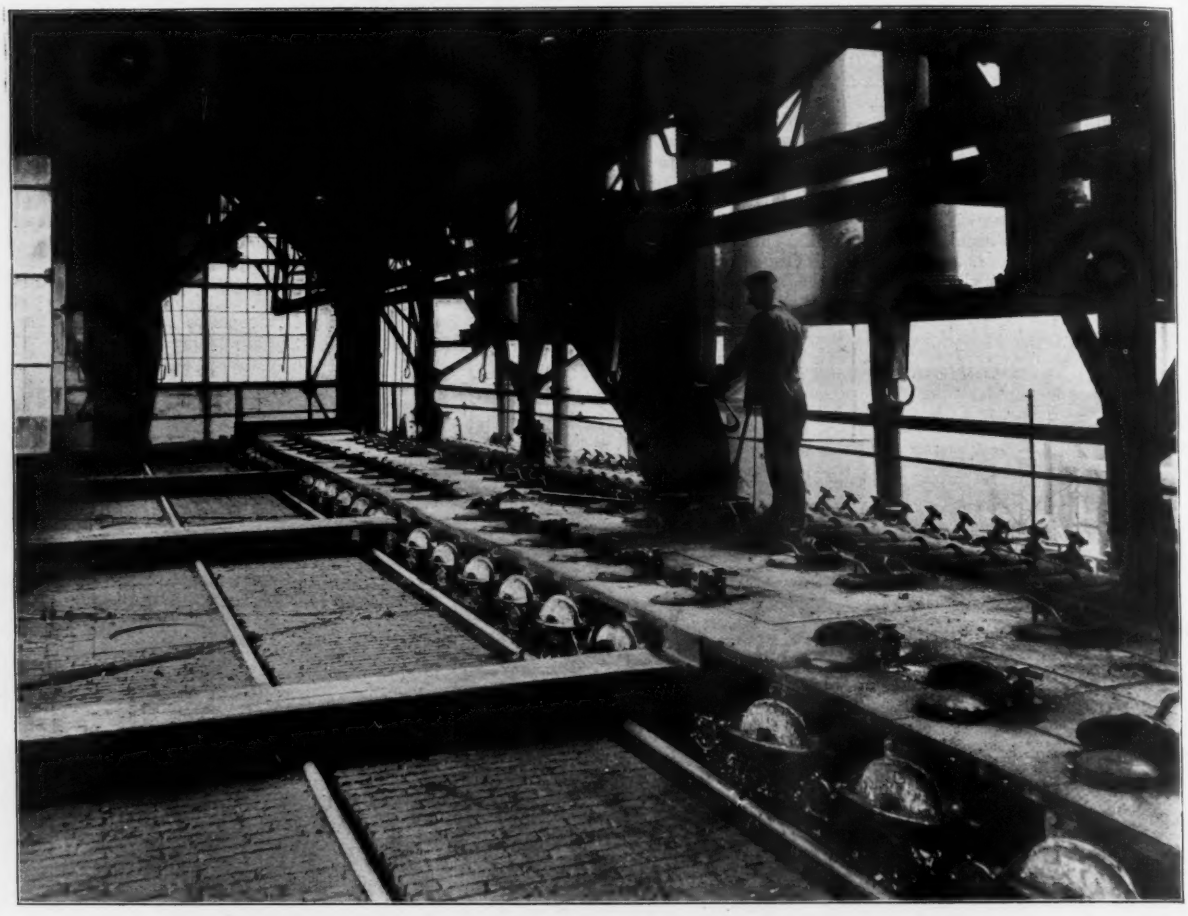
A photograph of a drawing is also reproduced, showing a sectional elevation and plan of a retort-house for vertical furnaces similar in design to that at Oberspree. It brings before us what Herr Körting, from his experience, deems to be an appropriate



Mechanical Arrangement for Manipulating the Bottom Mouthpieces at the Oberspree (Berlin) Gas-Works.

design for such a house. As was pointed out in the paper that he presented at last year's meeting of the German Association (many of the members of which the British visitors will meet in Berlin), in designing a house for this particular purpose three different operations—to be performed from three different positions in respect of the retorts—have to be borne in mind. Of these operations, the clinkering of the furnaces is really the most severe work, and is carried out on the ground-level at one side of the settings. The charging of the retorts with coal and of the generators with coke is effected from the travelling platform above. This work is not exhausting, but in summer is liable to try the men, owing to the heat evolved. The heat is, however, by no means comparable to that which is given off from the charging side of a Coze furnace. The retorts are discharged on the ground-level at the opposite side of the settings; but the man who attends to this operation has no hard labour to perform, and is not exposed to any high temperature, for as a rule he stands some 10 feet away from the brickwork.

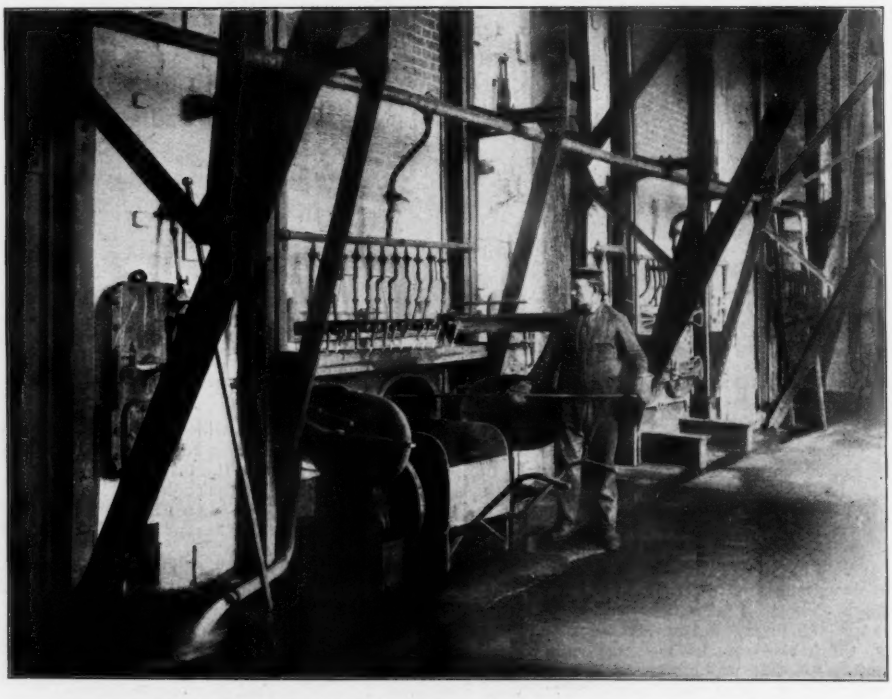
It is thus evident that the coolest place outside the house should be assigned to the men who clinker the furnaces; and if the house is designed to contain two rows of benches, the discharging spot should be between them. But the clinkering operation does not require a lofty space for its due performance—a moderately low addition being sufficient; and so the wall of the retort-house itself at Oberspree is identical with that on the generator side of the settings. As this wall is pierced with numerous windows above the top of the settings, the men who charge the retorts are close to the fresh air, and can have as much of it as the weather renders desirable. The roof rises towards the centre of the house, but does not extend far beyond the inner walls of the



Top of Furnaces, Showing the Charging Arrangements, at the Oberspree (Berlin) Gas-Works.

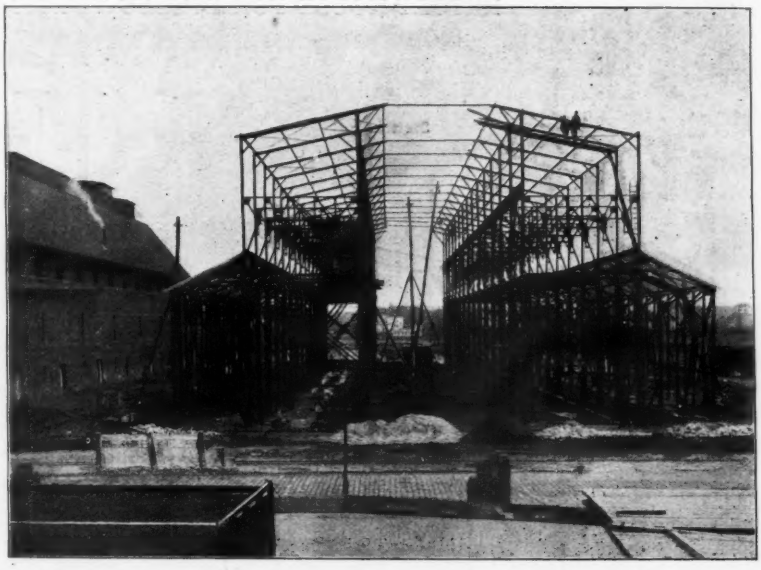
benches—thus leaving a very wide space uncovered, through which the hot air may, without hindrance, escape. De Brouwer conveyors are placed immediately in front of the settings, under the central opening in the roof; so that smoke and steam pass away at once, without inconveniencing the men on top of the retorts. This situation for the conveyor is preferred to one beneath the retorts, because it keeps all the moving parts and the coke itself in sight. Power to retain the conveyor and the coke under constant observation is of great importance—tending to the avoidance of accidents and either insufficient or excessive quenching. The small distance between the two conveyors is also advantageous, inasmuch as it simplifies the commingling of the two lots of coke, when further common treatment is requisite. The wide space (30 feet) between the two benches, the broad opening in the roof, and the large sliding-doors in the end walls of the house ensure thorough illumination and ventilation of the central passage, which, indeed, is really nothing but an open well.

Practical experience gained in working the house at Oberspree has shown it to fulfil every requirement, and to have no defects. In building it, convenience and economy were studied most of all.

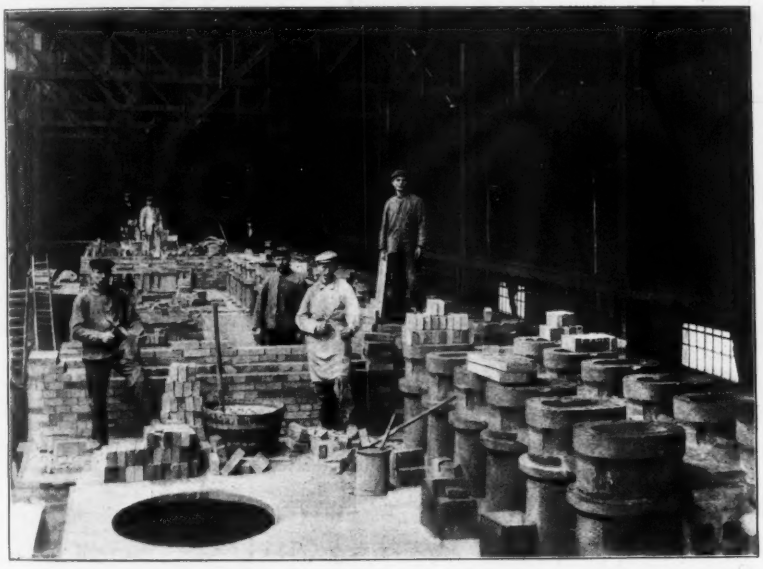


Back of Furnaces, with Clinkering Doors, at the Oberspree (Berlin) Gas-Works.

Wide roof spans are known to be an expensive item in constructional ironwork; and since in erecting inclined retort-settings the main buckstaves are often employed to support the overhead coal-hoppers, it occurred to Herr Körting to go further, and use the brickwork of the settings to carry the roof. He has made careful measurements of the deformation that has occurred in the well-braced retort-benches at the different Berlin Gas-Works during many years past, and has established the fact that, generally speaking, it has been very slight indeed. Armed with this knowledge, Herr Körting consulted Herr K. Bernhard, a well-known statistician and civil engineer, in order to see if some method of construction could not be devised in which the buckstaves of the retort-settings should be required to take vertical loads only, and should be free to move in other directions under the roof without affecting it in the least. This has been accomplished by fitting the tops of the buckstaves with special side bearings, on which the tie-beams of the roof lie. The tie-beams act as supports for the coal-bunker and the conveyor rails. The buckstaves are prolonged upwards still further so as to carry purlins that support the roof-sheeting. The tie-beams are carried at their ends on the side walls of the house, which are so tied to the foundations of the retort-settings as to form a rigid whole. Thus the bracing of the furnaces is only employed to carry vertical loads; the lateral stresses being taken by the foundations and outer walls. Security is obtained by connecting together the ends of the buckstaves that project above the brickwork by means of stout longitudinal and transverse ties.



Retort House No. 3 during Construction. To Contain 28 Settings of Verticals, of a Daily Capacity of Five Million Cubic Feet.



The Furnaces in Course of Construction.

Arrangements have been made in the Oberspree retort-house for the first time to keep the large coal separate from the small, and only to mix them when ready for carbonization. It need hardly be pointed out that if a vertical-retort is charged with fine coal, gas is evolved so rapidly as to set up a high positive pressure—a trouble that is not met with when large or nut coal is used. To prevent the formation of a high pressure, it is not necessary that the entire transverse section of the vertical retort shall be filled with nuts. All that is needful is a vertical column of nuts extending from the base of the retort to its top, so that an open channel for the escape of gas is present. Such a channel can easily be produced within the retort by charging it simultaneously, from two receptacles, with nuts and with small coal respectively. At Oberspree the broken coal falls from the elevator into a sorting drum, which fills one overhead store with large, and another with small coal. Each grade travels by itself to the hoppers over the retorts, which are divided into two continuous compartments by means of vertical partitions. The partitions extend downwards close to the emptying slides, and coincide with a dividing wall in the charging vessel. Thus when the lever is pulled, the latter receives a charge of coal in which the lumps and the small are still separate. Separation, indeed, persists till the retort mouthpiece is reached; and yet the whole of the arrangement works quite smoothly.

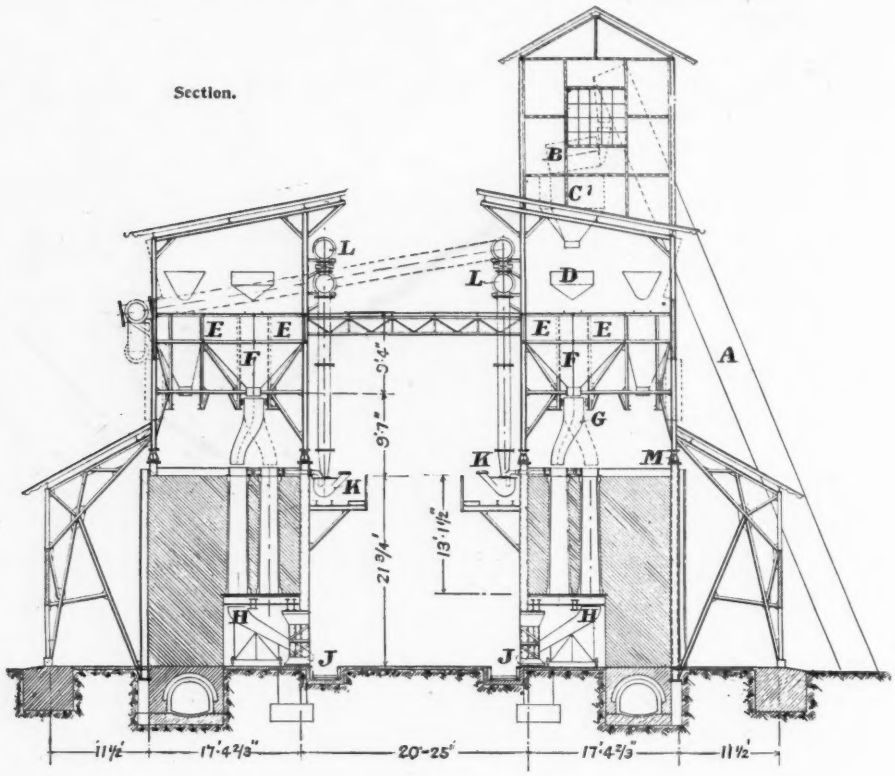
Herr Körting is convinced that a similar device would behave well if applied to inclined or horizontal retorts. It is well known that separation begins to occur directly mixed coal is fed into an elevated store—the lumps travelling to the sides of the vessel and the small remaining in the middle. The conditions that govern the satisfactory charging of a retort are totally different when the coal is large and when it is small. The operation cannot therefore be efficiently performed if the size of the coal constantly varies. If a gas engineer is enabled always to put a uniform mixture of large and small coal into his retorts, he is in a position to obtain better results than he otherwise could; and the simplest and best method of achieving this end is, Herr Körting holds, to keep the two sizes apart until the very moment of charging.

From the indications here, the intending visitors to Berlin will see that at the Oberspree and Mariendorf works of the Imperial Continental Gas Association much of technical interest awaits them. The Tegel works of the Berlin Municipality will be dealt with and illustrated next week.

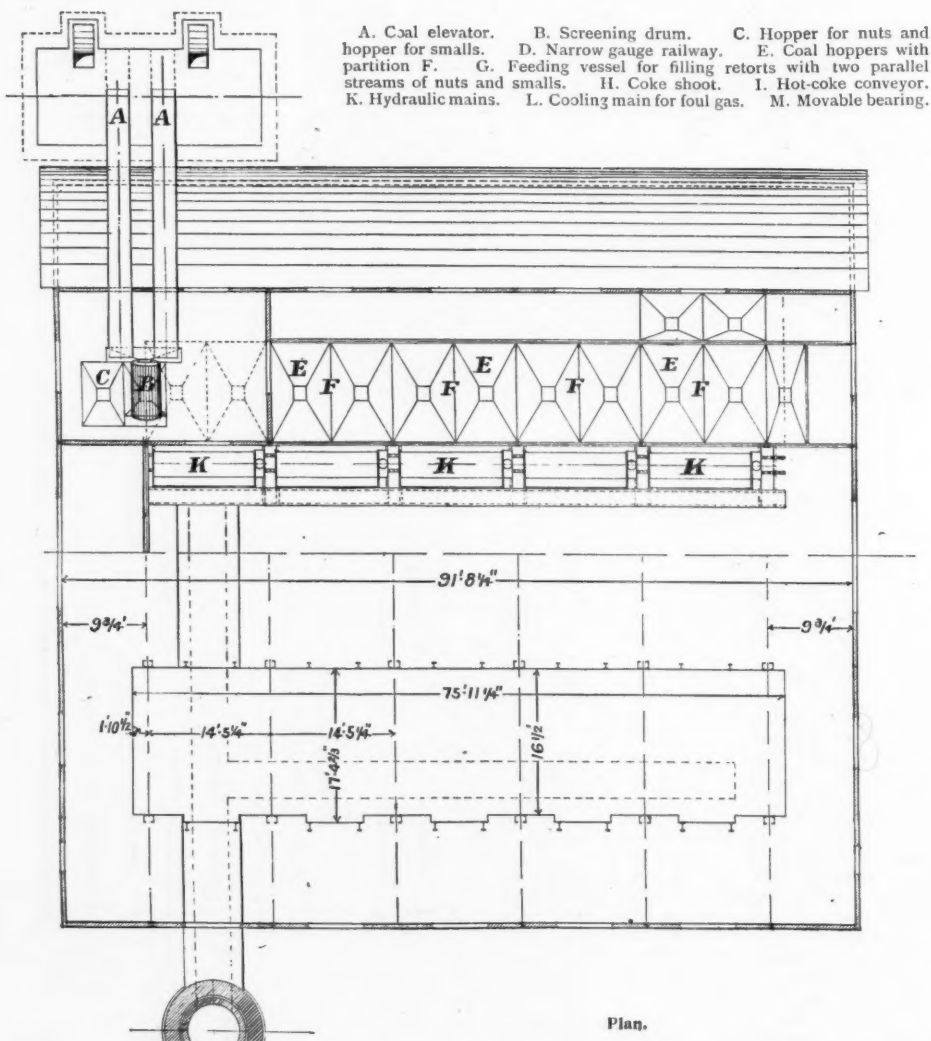
Back of the Furnaces, showing the Clinkering Doors.

RETORT-HOUSE FOR DESSAU VERTICAL FURNACES.

Section.

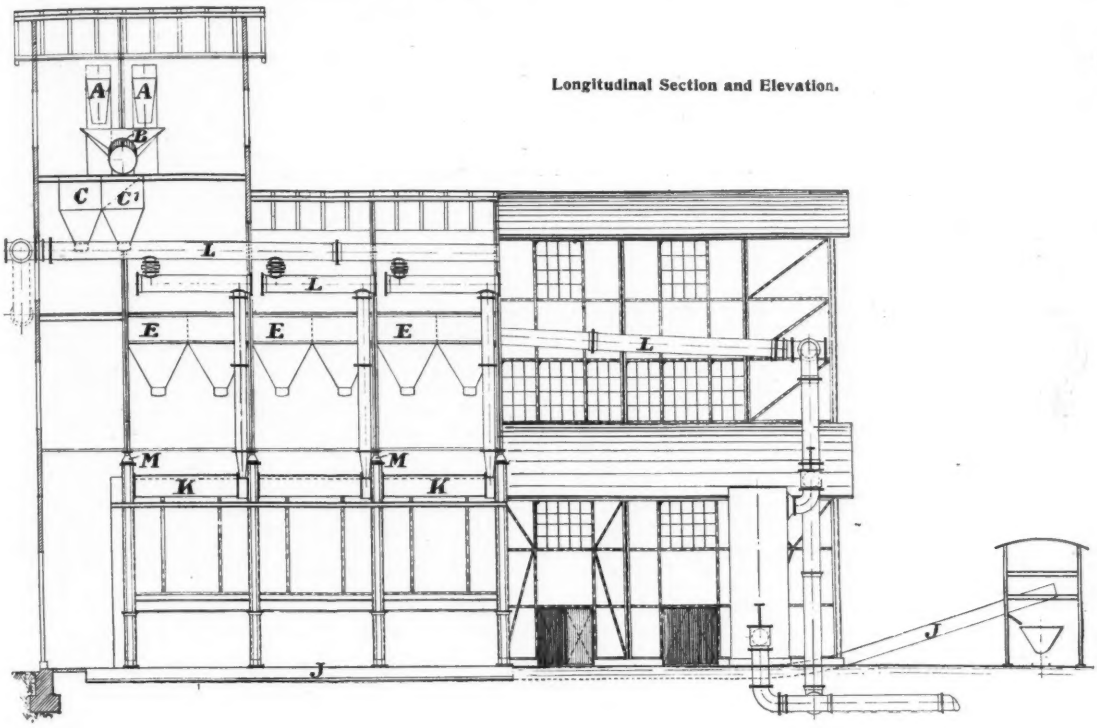


A. Coal elevator. B. Screening drum. C. Hopper for nuts and hopper for smalls. D. Narrow gauge railway. E. Coal hoppers with partition F. G. Feeding vessel for filling retorts with two parallel streams of nuts and smalls. H. Coke shoot. I. Hot-coke conveyor. K. Hydraulic mains. L. Cooling main for foul gas. M. Movable bearing.

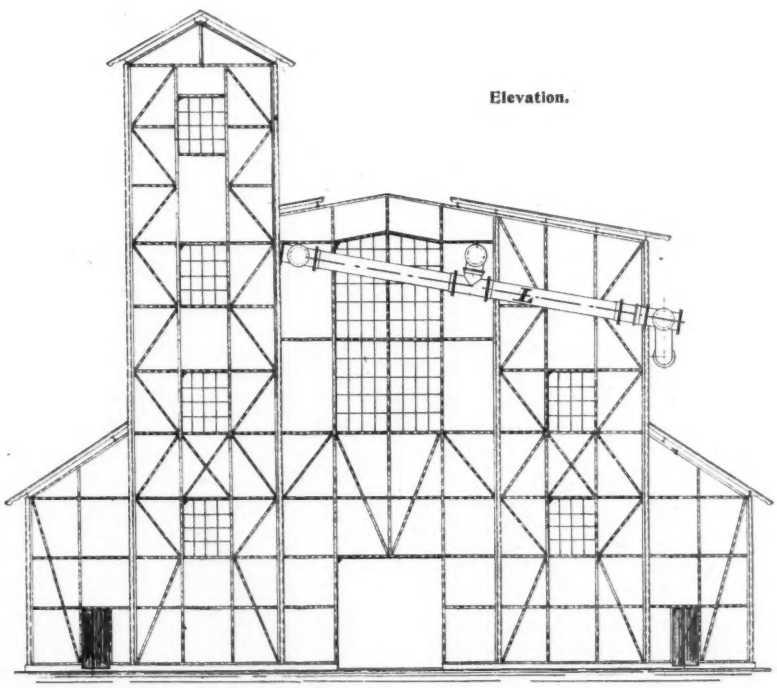


Plan.

RETORT-HOUSE FOR DESSAU VERTICAL FURNACES.



Longitudinal Section and Elevation.



Elevation.

Self-Pumping Artesian Wells.—The field men of the United States Geological Survey, in their investigations of the ground-water resources of the Virginia Coastal Plain, have observed that the flows from many artesian wells in that region are utilized to drive hydraulic rams for the purpose of lifting the water to higher levels. According to the "Journal of the Franklin Institute," along the lower courses of the Potomac and Rappahannock, and by the shores of the many inlets that run back from Chesapeake Bay above the James, there are hundreds of artesian wells that supply a perennial flow of clear water which, as a rule, is excellently adapted to all domestic uses, and is largely utilized by the canning factories and other industrial establishments that abound in that part of the country. Though the pressure of the water from the wells is ample at the shore level, the head diminishes so quickly with increase in elevation that no flow can be obtained along the higher banks above the shore, where the water is most needed. The common method of obtaining it at these higher levels is to use the force developed by the artesian flow to operate hydraulic rams, which in turn raise the water to the heights desired along the bluffs above the rivers and inlets. Thus it may be said that the artesian wells pump themselves.

At the offices of the Metropolitan Water Board last Friday, a gold watch and an address were presented to Mr. J. Wright, the Superintendent of the southern district, who has been connected with the water supply of South London, first as an officer of the Southwark and Vauxhall Company, for 44 years, and is now retiring on a pension. The presentation was made by Mr. J. W. Restler, M.Inst.C.E., the Deputy Chief Engineer, in the presence of many officers of the old Company (of which Mr. Restler was the Engineer), and also of the Board; and he spoke in high terms of Mr. Wright's services.

The water-tightness of the concrete walls of the Cornell University water purification plant, constructed about three years ago under the direction of Professor Gardner S. Williams, says "Engineering Record," is an indication of what can be accomplished with careful workmanship. The coagulation basin has walls 15 inches thick, and their bottom is under a head of 22 feet continuously. The slight percolation through the tank that was present when it was first put into service has practically disappeared; and throughout the 60 feet of length of the wall where the concrete is exposed there is now scarcely a perceptible sign of leakage.

ELECTRICITY SUPPLY MEMORANDA.

Lower Candle Power Metallic Filaments for High Voltages—Brittleness and Life—Blackening and Illuminating Power—Osram Lamps in the Street—Optimism and Pessimism—A Good Comparison for Gas—Water to the Aid of Electricity—From Municipality to Financier.

THE electrical engineers have had another turn at the metallic filament lamps (or "wire" or "metal" lamps as some lazy people would call them to save their breath or ink); and convictions regarding them are as unsettled as ever they were. The paper on this occasion was read by Mr. H. Hirst; and a meeting of the Institution of Electrical Engineers was the occasion. Mr. Hirst is associated with the General Electric Company, the makers of the Osram lamp—a Company which some time since made themselves responsible for certain comparisons with incandescent gas lighting that they had not the courage to back up by a little public competition which was offered to them, and for the non-acceptance of which excuses more amusing than valid were made (not by themselves) but by their would-be friends. In his paper, Mr. Hirst had nothing new to talk about. Others before him have said as much as could be said about the metallic filament lamp. What electrical engineers were anxious to hear from him was something as to the prospects of lower candle power metallic filament lamps with an efficiency of 1 watt per candle and for the higher voltages being forthcoming; and those who want them will be disappointed at the pessimistic attitude of Mr. Hirst on the subject, and those who fear for their finances will be, in a degree, reassured by his attitude. Of course, Mr. Hirst speaks with a confidence born of practical experience. He says very distinctly that the high-voltage lamps, made for from 200 to 250 volts, require double the number of filaments used in the low-voltage lamps, and consequently, up to the present, 40 to 50 candle power is about the lowest unit that has been obtained in a commercial lamp, and some extraordinary development or discovery will have to be made before this candle power can be largely reduced. Thus it will be necessary to still rely on series running whenever low units of light are required on high-voltage circuits. This means that series running will have to be in the main continued in private houses and for confined spaces, which make it so much the worse for the electricity undertaking in the competition with incandescent gas lighting, and so much the better for it in retaining the current income from private houses. But in respect of shops, hotels, clubs, &c., the 50-candle power high-voltage lamp will, as it must do, cause anything but an insignificant drop in revenue.

Not only is the number of filaments great in these lamps, but their structure is of a treacherous character. Mr. Hirst points out that in 120-volt 22 to 27 candle power lamps at an efficiency of 1·1 watt per candle per hour, the diameter of the filament is only 0·03 mm., and that it is very brittle. On this point of brittleness, he told his hearers that the difficulties of transit in bulk have been overcome; and small parcels are now being dealt with. We have heard of as many as 33 per cent. of a consignment of metallic filament lamps having been placed *hors de combat* before reaching their destination; and Mr. Leon Gaster speaks of having a parcel of 24 of the lamps (not Osrams) sent him, of which only four survived the journey. In face of this, it is puerile to give life figures ranging from 700 to 2000 hours without qualifying them with a statement to the effect that such lives are after the lamps get safely landed in their holders, and not before, and that again this is subject to the lamps not blackening. The cost of renewals should begin to be calculated from the moment the lamps are parcelled up for the purchaser; and then (if he has only partially Mr. Leon Gaster's experience), he may find his renewal bill work out to more than the account for electric current. Nearly all the figures as to life that have been published have been of lamps after they have been put in the holders, and mostly under laboratory conditions; and there is no doubt there is some bad experience at the back of the hope of Mr. Wordingham that makers of the lamps will soon invent a good anti-vibration holder.

Reference has been made to the blackening of the bulbs—not generally, but in individual cases. When this occurs, it is, as a rule, at an early stage of the lives of the lamps; and Mr. Hirst gratified the ears of his audience by telling them that these—in the case of the Osrams—would be dealt with generously by the makers. Station engineers should distribute this information among users of these lamps, as the knowledge would perhaps be extremely useful to many who have blackened lamps in use, but put up with the diminished light rather than, as they suspect they would have to do, incur an outlay of 4s. per blackened lamp. Otherwise it is claimed that there is no appreciable drop in the candle power of these lamps during life—only about 10 per cent. in 1000 hours, which electricians say is the drop in the illuminating power of a gas mantle in 100 hours. We have argued this matter before; but the electricians who make assertions about "mantles" dropping in illuminating power are singularly reticent about discussing the question. We will do them the credit of believing that they know something about the chemical constituents of which gas mantles are composed. That being so, will they tell us what they believe to be the reasons for the alleged remarkably rapid decline in illuminating power, after a mantle is put into use? because if we can get at the reasons for their belief, or rather statement, an interesting discussion may ensue. There is nothing unfair in asking this, in view of the reiteration of the statement. To return to the metallic filament lamps. It is claimed that the variations of voltage have less effect on them than on carbon filament lamps. From a fairly wide observation, we have no cause to dispute the point; but it just crosses the mind whether the complaint that has been made by a Committee of the Birmingham Chamber of Commerce of "damage done to electric lamps in the city by variations in the pressure of supply," include metallic filament lamps. While on illuminating power, there is just one other point about which explanation would be interesting. Mr. Hirst remarked that Hefner "candle" power [why will electricians persist in saying Hefner "candle" instead of Hefner unit?] is adopted throughout his paper, as at present "it is found next to impossible to try to standardize metallic filament lamps per candle power. It would make the lamp commercially impracticable." Why?

Shop and large interior lighting is provided for by the 50-candle power metallic filament lamps which do not disapprove of the higher supply voltages; and it is considered that they will also do well for street lighting. Mr. Hirst quoted some figures, giving the average life of sixteen Osram lamps in use in the streets of Canterbury; and the average works out at 1834 hours (eight are still running); while the average of 29 (15 still running), enclosed in lanterns, is 1792 hours. That is nothing. In the street outside we see an incandescent gas-lamp (representative of many) in which there is a gas-burner originally costing about 1s. that has been there for years. Assuming that for a 4000-hour use a year only two Osrams were required in a street lamp (winking at the breakages that might be incurred in getting these two Osrams there from the makers), the 8s. so expended would provide that incandescent gas-burner with mantles for some years, and not be a recurring expenditure year by year. Again, in the discussion on Mr. Hirst's paper, Mr. Drake put a question to which we have not yet seen an answer. Has, he asked, anyone noticed that the metallic filament lamps have a longer life in the winter than in the summer? also that, when exposed in the streets for public lighting, the sun's rays are apt to have an effect on them? Thinking over these Canterbury tales, it must be comforting to the electricity suppliers in the city to have a little encouragement from long-life electric lamps. They only made £73 net profit last year, against £412 in the previous one. And talking of encouragement, Mr. Hirst—as interested in the making of Osram lamps—bid electrical engineers be of good cheer, for he believes the lamps are going to work great miracles, and beneficial ones, too, on their finances. Other people are not so sanguine. Mr. Arthur Wright is not. In his capacity of Consulting Engineer to the Marylebone Borough Council, he has reported to the Electricity Committee that "the whole question of electric lighting revenue is in a very critical state, owing to the rapid introduction of the metallic filament lamp." The General Electric Company are reaping profits from the making of metallic filament lamps; the central station engineer is losing revenue through them from the sale of electricity for lighting purposes. The points of view are not precisely the same.

The electrical papers are at times really amusing. One of our staid and friendly contemporaries uses as a "fill-up" to one of its columns a paragraph lifted from the "Electrical World." It is too good to miss a word. The paragraph is headed "Tungsten Lamps *v.* Gas;" and reads: "The 'Electrical World' contains some interesting figures on this subject referring to the lighting of a chemist's shop. It was formerly lighted by 24 eight-candle power lamps, consuming 771 watts. These were replaced by three 'gas arcs' consuming gas at 5s. 8d. per 1000 cubic feet; and the total cost for 1000 hours, including maintenance, was £13 10s. 9d. The tungsten lamps now installed are of the 40 watt type, and cost, including renewal of the lamps, £10 12s. per 1000 hours." The 5s. 8d. for gas is an abnormal price. The normal prices for gas range between 2s. and 3s. per 1000 cubic feet; so that if the chemist had been fortunate enough to be in a district where the price of gas was even 2s. 10d., the cost of his gas would have been brought down one-half; and at that price, and particularly where it was lower, the tungsten lamps would have been considerably out of the running. The chemist is to be pitied in that he is unfortunate enough to live in a district where gas is so high in price. There is missing from the paragraph information as to the types of lamps employed, the number of tungsten lamps, illuminating power of the "gas arcs," hours of use, and so forth. Anyway, so far as it goes, it is an instance of practical experience; and we express the obligations of the gas industry to our electrical contemporaries for publishing it.

The Electricity Department of Gloucester ought to feel awfully small to-day, in having received charity from the Water Department. The Electricity Department, through the Committee conducting the business on uncommercial lines, made a debit balance last year of £1412; and the Finance Committee were struck with the brilliant idea that this could nearly be made good by transferring £1200 standing at the credit of the Water Department's accounts to the credit of the accounts of the Electricity Department. A few days ago there was a discussion on the subject at the meeting of the Council; and the proposal was met by an amendment in the shape of a direct negative. The success of the proposal creates a very dangerous precedent. Only a comparatively few ratepayers are electricity consumers; practically all are water consumers. The comparatively few electricity consumers are not charged a sufficient price to meet the financial obligations of the department supplying them; the whole of the water consumers

are charged more than a price sufficient to meet the responsibilities of the water undertaking. Why should the excess amount they pay be used to balance the amount which the electricity consumers pay short of requirement? There are members of the Council who regard this robbery of the water consumers, for the sakes of the electricity consumers, as legitimate business. We cannot discuss their reasons for so thinking, because they fail to advance any serious ones. Electricity is supplied at a loss somewhere. It is the duty of the Electricity Committee to find out where, and immediately set about remedying it. Robbery is not honest business, nor is it justice to compel one man to contribute towards the payment of what another man has had. The amendment was only defeated by 20 votes to 16. If the twenty included the members of the Finance and Electricity Committees, then the victory of robbery is easily understood.

There has been a copious flow of oratory in the Bath City Council lately over the question of selling the electricity works to Mr. Schenk. About fifteen months ago the Council were unprofitably engaged in the same manner; the offer being made on behalf of the Somerset and District Electric Power Company. The idea was at the time purchase outright at £162,439, with an immediate profit to the city on the capital expenditure, and some other advantages that were preferable (in view of the cash payment) to a continuation of the disappointment and the hazards that have ever been associated with this concern. Mr. Schenk, it is gathered from the flood of talk at two meetings of the Council, has been roaming all over the country to get the capital required for the purchase; but he failed. There is no surprise that even such an astute man as Mr. Schenk could not get capital for an Electric Power Company, with an undertaking for a nucleus that has had such a drab sort of history as that at Bath. Now, he has come forward with a revised scheme of purchase, which briefly proposes £22,500 down, and the balance over thirty years, with interest at 3½ per cent., and power of re-entry at the end of the thirty years. The city, too, are to receive £500 worth of current free of cost; and a reduction of £878 on the public lighting, with other conditions attached protecting the Bath consumers. We are not sufficiently interested to go into them all here; but how glad the Corporation are to get rid of the undertaking is seen by the fact that 27 members voted for the revised offer and only nine against it, and this after the abortive agreement fifteen months ago. The question of security, with payments spread over thirty years, is one that should be looked into very carefully by the Bath people, in view of the unprofitable nature of electric power companies, and the egregious failure of the South Wales Power Company. The experiences of a twelvemonth should be sufficient to excite the greatest caution. If the Bath Corporation are innocent of all knowledge of such matters, some kindly disposed friend should tell them something about them. It is not our business; we do not like municipal trading.

Yorkshire Junior Gas Association.—The members of this Association will pay a visit next Saturday to the works of Messrs. Robert Dempster and Sons, Limited, at Elland.

Society of Chemical Industry.—On the occasion of the forthcoming annual meeting of the Society, to be held in Newcastle-upon-Tyne from the 22nd to the 25th prox., visits will be paid to some of the principal manufacturing establishments in the neighbourhood. Among them are the Redheugh works of the Newcastle and Gateshead Gas Company; the Clarence works of Messrs. Bell Bros. at Middlesbrough, where the Huessener coke-ovens, with recovery of bye-products and the manufacture of benzene, are in use; Messrs. Priestman's Otto-Vale works, where the visitors will witness the manufacture of coke in the Otto-Hilgenstock ovens, with recovery of bye-products; and the Allhusen works of the United Alkali Company, where the Chance sulphur recovery process is in operation.

Engineers and the Metric System.—At the meeting of the Society of Engineers on Monday last week, Mr. A. E. Allen read a paper on "The Engineering *Pros* and *Cons* of the Metric System." The author explained that the metric system was devised to replace existing, but disorganized, weights and measures in France, and with a view to its ultimately becoming universal; to provide standards derived directly from natural and invariable bases; and to provide a homogeneous and interdependent system of units which should facilitate international commerce to the utmost. A brief outline of the principal features of the system as used in practice was given, and it was shown that the accuracy of the relation intended to exist between the units of length and mass had been realized to a degree almost incredible, and far beyond all practical requirements. The educational economy of the system in comparison with British methods was demonstrated, and the saving of labour in commercial transactions due to its use, as well as the decreased liability to error in computation, was explained. The ease with which the metric system can be applied to engineering work was shown, with examples; and it was pointed out that where the limit-gauge system is in use, the adoption of the system does not even require the workman to become familiar with it, though no difficulty was experienced teaching him. Both systems could, it was stated, be used simultaneously in the same shops without confusion, and the larger tools did not require any alteration to adapt them to the metric system. The author thought the benefits to be derived from the compulsory adoption of the metric system would far outweigh any temporary inconvenience that might be incurred.

A FRENCH PAPER ON VERTICAL RETORTS.

M. Marquisan is well known as having been for many years past the successful Honorary Treasurer of the Société Technique de l'Industrie du Gaz. He it was, also it will be remembered, who represented the French Gas Society at last year's meeting of the Institution of Gas Engineers, held in Dublin on the occasion of the exhibition there. He has recently compiled a lengthy and detailed paper on "New Methods of Carbonizing Coal for the Manufacture of Gas;" and it was read before the Société des Ingénieurs Civils de France at the ordinary meeting of the Society on the 1st ult. M. Marquisan's contribution to the complex and ever-varied and important subject of carbonization is, avowedly, a compilation from various sources—English, French, and German—of the views expressed by different engineers in different countries, and of the many articles dealing with the matter that have appeared of late in the Technical Press, more especially since the advent of new stoking machines and vertical retorts. Much of the matter, therefore, of which the paper is composed has already appeared in our columns, and to reproduce it at length would serve no useful purpose. To say this is by no means to reflect on the utility of M. Marquisan's paper to the French Civil Engineers, who, of course, are a body representing varied engineering activities, and are not specialists in carbonization or gas manufacture. On the contrary, that body is to be congratulated on having members, like M. Marquisan, who can put before them a comprehensive account of an intricate problem of a specialized industry. With this explanation, we will proceed to give a much condensed and paraphrased (translated) summary of M. Marquisan's valuable paper, the full text of which has been obligingly furnished us, and which in due course will appear in the monthly "Bulletin" of the French Society of Civil Engineers.

Part I.—General and Theoretical Considerations.

The author refers in the first instance to the presidential discourses of M. Reumaux, on the coal output and outlook in France,* and of M. Cornuault, on the progress of gas and its consumption.† Gas is restricted to the use of coal; but other industries, chemical and metallurgical, can find the source of their power in what may be called "white coal." England carbonizes annually some 15 million tons of coal in its gas-works; Germany, 5½ million; and France, 3½ million; while Switzerland, Belgium, Holland, and the United States reduce their coal consumption by using 20 to 30 per cent. of carburetted water gas. New methods of distillation have ameliorated conditions, and increased the make of gas and bye-products, while reducing the cost of labour. Such methods are chiefly the vertical retort, and carbonization in large quantities more or less on the lines of coke-ovens.

The author next refers to the investigations of M. Sainte-Claire Deville and others into the systematic classification of coals, and the results of subjecting them to varying temperatures, and the consequent differences in the composition of the gas. The lighting power of the constituents of an average sample is given as follows:—

Lighting Power per 150 Litres of Gas.

	Hefner Candles.		Carcels.
Methane	6	..	0·552
Ethylene	68	..	0·25
Acetylene	240	..	220·8
Benzol	420	..	386·4

Benzol provides the greater part of the lighting power; but methane supplies more than half its heating effect.

To show the influence of temperature on the quantity and quality of the gas, the following results per 100 kilos. of coal are given:—

Temperature.	Make. Cubic Metres.		Lighting Power. Hefner Candles.		Carcels.
Dull red (about 700° C.)	23·3	..	20·5	..	1·88
Clear red (about 900° C.)	27·5	..	17·8	..	1·63
Orange red (about 1100° C.)	34·0	..	15·6	..	1·43

It is important, then, to regulate the temperature so as to have as big a make of gas as possible, while keeping the largest proportion of heavy hydrocarbons required for the lighting power, and of methane for the heating power. How these and other *desiderata* are affected by the mode of carbonizing adopted is next considered. The old light charges by hand, when systems of retort-heating were not so good, were based on sound reasoning. The adoption (particularly outside France) of the inclined retort, and the important installations at Edinburgh, Zurich, and Mariendorf, are named. The principle of the inclined retort is also being applied to retort-ovens at Munich, Hamburg, and even to coke-ovens. The advent of projecting machines, such as the De Brouwer, Sutter-Harlé, and Cabrier, and their accessories, has maintained the undeniable advantage of simplicity in the case of horizontal settings, while also allowing of increasing the weight of the charges. The higher temperature of carbonization involved is not the only factor to be considered; in addition, are the pressure in the retort, and the free passage of the gas from the mass. In this connection, papers by Dr. Harold G. Colman and Professor Vivian B. Lewes are quoted from. This leads up to the carbonization of coal in vertical retorts. These are divided into two classes:

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* See "Journal," Vol. CI., p. 283. † *Ibid.*, Vol. XCVII., pp. 207, 272.

(1) The intermittent or discontinuous system, of the type originated by Dr. Bueb, of Dessau, which is the most generally adopted at the present time. (2) The continuous vertical retort, of a type tried in France, but more especially in England by Messrs. Woodall and Duckham.

Other inventors have also sought to split up the tar, as has been done in the Dinsmore horizontal system. The introduction of the steam from coke-quenching has been generally tried. Whatever the type, the essential condition or characteristic is the complete filling up of the retort; that is, doing away with the free space that is left above the charge in a horizontal retort.

Part II.—Intermittent System.

The first experiments of Dr. Bueb showed (1) that vertical retorts could be heated to a high temperature without causing any swelling of the coal and dangerous pressure, and that it was not necessary to leave space for coal expansion; and (2) that the destruction of the hydrocarbons could be prevented by allowing the gas to get away as soon as produced. In the first bed of six retorts, they were heated only on three sides, and the gas was taken off at the sides at different heights. This principle was patented in England as early as 1892. Modifications followed by the late Mr. Drory and Mr. Ernest Körting; and in 1905 Dr. Bueb described a setting of ten vertical retorts, 4 metres (13 ft. 1½ in.) high, carbonizing 500 kilos. (nearly 10 cwt.) charges, in eight to ten hours, producing 400 cubic metres (14,126 cubic feet) per retort per 24 hours. From the experience of working at Dessau since June, 1905, and at Oberspree, Berlin, since June, 1906, it can be said that repairs can be done very easily and cheaply. The results were: Make of gas, 31 to 33 cubic metres per 100 kilos. (11,124 to 11,841 cubic feet per ton); lighting power, 15 Hefner candles; calorific power, 5400 to 5100 calories; coke, 71 per cent. with Westphalia coal; fuel, 14 per cent.; ammonia, 50 per cent. more than usual; tar, 5·6 to 5·8 per cent., containing more light oils, less naphthalene, and less pitch. The temperature at the lower end of the retort was 1400° C. Notwithstanding this high heat, the results proved that the distillation was carried on under more reasonable conditions than in ordinary retorts. The gas passed through the comparatively cool centre of the charge, being 90° C. at the commencement and increasing to 620° C. at the end of nine hours. The gas also gets away quicker—in five times less time—than in horizontal retorts. But would not cracks in the coke formation allow of the passing of the gas in that way? Herr Hilgenstock, at the Düsseldorf Congress of 1902, showed, from his experience with coke-ovens, that as each vein of coke was formed there was a kind of tarry wall or diaphragm heated on one side by the coke already made, and cooled on the other by the coal not carbonized. The moisture in the coal passed towards the centre. Gas in a vertical retort would do exactly the same.

The starting of the new system of carbonization at Dessau was enthusiastically welcomed by German gas engineers as a fact of great importance in the history of the gas industry. "In England, where continuous charging was the solution sought, the event was received with certain reservations. The novelty of the invention, the question of yield of gas, the high percentage of fuel used (14 to 15 per cent.), the pressure at the bottom of the retort, and the probable cost of upkeep, were discussed. The perusal, at this time, of the important English gas paper, the 'Journal of Gas Lighting,' whose editorial articles are so notably written, affords some rather piquant and interesting reading." But, continues M. Marquisan, the Imperial Continental Gas Association at Berlin is an English Company; Mr. Körting was given the gold medal of the Institution of Gas Engineers for his paper in 1906 on vertical retorts; and Mr. Charles Hunt, the President in 1907, returning from a Continental journey, said that the vertical retort in the hands of his German colleagues had become an accomplished fact.

Dr. Bueb, in 1906, at the congress at Bremen announced even better results, due to the introduction of steam during the last hours of the charge; thus arriving at a make of 35 cubic metres per 100 kilos. (or 12,560 cubic feet per ton). The hourly uniformity of production of gas is attributed to supplementary distillation taking place in the layers of coke at the periphery of the charge.

Meanwhile, Mr. Körting at Berlin, in November, 1905, was proceeding with tests on retorts 5 metres (16 ft. 5 in.) long, in settings of twelve, so as to effect greater economy and have a greater height of coke, to act as a water-gas generator. The lighting power was thereby considerably reduced. The results given at the meeting in June, 1906, of the Institution of Gas Engineers were—

Without Steam.—326 cubic metres (11,698 cubic feet) per ton, of 5457 calories and 13·5 English candles.
With Steam.—369 cubic metres (13,240 cubic feet) per ton, of 5211 calories and 11 English candles.

By the end of 1906, 71 beds or 710 retorts had been put up at Zurich, Dortmund, and Cologne; the last consisting of 24 beds producing 85,000 cubic metres (about 3 million cubic feet) per day. The four-metre (13 ft. 1½ in.) length of retort has been generally adopted, as by the Union des Gaz Company for their installation of eight beds at Genoa. The diminution in illuminating power in the five-metre retort is attributed to its higher temperature—viz., 1400° C., as against 1300° C. in the four-metre retort, in which latter also the temperature from bottom to top diminishes less rapidly.

The author then quotes at length from the recent articles of Mr. E. Körting and Dr. Harold G. Colman (see "Journal," Jan. 14 and March 17, 1908). Besides the question of illuminating power, other circumstances may have to be taken into consideration. For example, if coke is dear, the amount for sale could be increased by doing away with the introduction of steam into the retort. If, however, coal was dearer, the make of gas could be increased. But the question will undoubtedly be made clearer by further experience. Up to March last, there were sixteen installations working, and eleven in course of construction—in all, 1880 retorts, of which 204 at Berlin are of five-metre length, and the rest, it is supposed, four metres long. The daily production of gas, then, from the longer retorts would be 86,458 cubic metres (or 3,053,400 cubic feet), and from the shorter ones 666,898 cubic metres (or 23,552,500 cubic feet).

Part III.—Continuous System.

While Germany was giving attention to the intermittent charging of vertical retorts, France was trying the continuous carbonization of small charges. MM. Verdier and Teulon, at the Marseilles Gas-Works, in 1903, tried a vertical retort with a space left at the top of it to facilitate the production of gas and the splitting up of the tar. Coal was introduced in proportion to the coke taken away. The general idea was the same as that followed by English engineers. The yield per ton in carcels, which is the present true measure of the value of the coal, increases with smaller charges. Conversely, the quality of the tar diminishes with smaller charges, and improves with heavier ones. Gas and tar are thus in opposition. In England, an analogous theory was put forth as to the difference of the effect of heat on the molecules of gas and tar.

The Verdier and Teulon retort, coming to naught, was taken up by the Lyons Gas Company. In England the first application of the vertical retort was due to Messrs. Settle and Padfield at Exeter. Their patent of June, 1902, is described by M. Marquisan, with the results claimed. The characteristic feature of the Settle-Padfield retort was the reduction by 50 per cent. of the tar, and even its complete suppression. Then came the bench of six retorts at Cleethorpes (September, 1905), Rotterdam, and Tegel (Berlin). The first was not successful and was abandoned.

Meanwhile, Messrs. Woodall and Duckham were working away discreetly at Bournemouth; and several engineers had studied the problem more or less theoretically. M. Marquisan quotes from the articles and papers on the subject, which appeared in the "Journal" at the time (1906), by Mr. W. R. Herring, the late Mr. William Young, Mr. Samuel Glover, of St. Helens, and Mr. Thomas Glover, of Norwich. The last-named returned to the question of the special action of radiant heat. "We have mentioned," says M. Marquisan, "this theory of radiant heat, because of the place which it has taken in the technical literature of England, and because of the standing of the engineers of this country who have given voice to it. However, even in England, it has met with contradictions from those who charged it with not being supported by sufficient experiments." The results of the working of the Young and Glover retort will, he says, be awaited with interest.

The Woodall-Duckham retort works without having a free space. It is not designed to split up the tar, but is completely filled and continuously charged. The highest temperature is at the top. Mr. Körting's expressed views on it are quoted: Its continuity, cleanliness, machinists replacing stokers, and small production of water gas, if the calorific power of the gas is not to be too much reduced. Dr. Bueb also referred to this attempt to solve four problems—viz., continuous coal supply, continuous gas production, continuous coke extraction, and the use of the incandescent coke to produce water gas. Such are the problems to which Messrs. Woodall and Duckham have most perseveringly devoted themselves since 1903. The author proceeds to describe in detail the plant and apparatus, with which our readers are already familiar. The results are summarized thus: High make of gas of very satisfactory quality; fluidity of the tar; yield of ammonia; absence of naphthalene; the reduction of cyanogen. All these points show that the Bournemouth retort reaches as nearly as possible the theoretical conditions for the manufacture of gas; the production of water gas being accessory, but nevertheless permitting, to some extent, the utilization of the heat of the coke. Further, with the suppression of the hydraulic main, continuous charging, and the absence of smoke and dust, the working conditions ought to be much improved. Also, by dispensing with house and by the small space occupied, the first cost should be reduced. Should the results of the new installation of twenty retorts at the Nine Elms works confirm those already obtained, as is to be hoped, one will be able to say that the old dream of continuous carbonization has at last been realized.

Part IV.—Gas-Ovens.

We have seen the modifications introduced by the discontinuous vertical retort of Dr. Bueb in regard to increasing the charges and prolonging the time of distillation. Also, the totally different methods adopted in France and England, culminating in Messrs. Woodall and Duckham's continuous retort. The tendency in Germany towards heavier charges led the engineers at Munich, trained in the school of Schilling, to study the manufacture of gas on the lines of metallurgical gas production. The idea of replacing retort-beds by coke-ovens for illuminating gas was especially taken up in America. To get both hard coke and

illuminating gas was not a new idea any more than was the vertical retort. In France, the Panwells oven was designed with this object. In 1856, the first bye-product recovery coke-oven was put up by Knabe at Commentry. Improved by Carvès, it was adopted at St. Etienne, and in 1873 in the Gard. Only in 1881 was it applied in Germany. In America the first installation of the Semet-Solvay oven was put up at Syracuse (New York State) in 1893. Then followed other coke plants, and the Otto-Hoffmann system in Pennsylvania.

Together with tar, benzol, and ammonia, gas became a bye-product; and the utilization of it, first for motive power and then for lighting, was sought to be effected. In 1898, the New England Gas and Coke Company put up at Everett, near Boston, a large installation of 400 Otto-Hoffmann ovens, divided into eight groups of 50 ovens. In September, 1901, Dr. Schniewind, of New York, contributed an important paper on the subject to the International Engineering Congress in Glasgow. The Boston enterprise was not a success; and in April, 1901, it went into liquidation. The same question of gas-producing coke-ovens came up at the Düsseldorf Congress of 1902, when Herr Hilgenstock contributed a paper, to which reference has already been made. His conclusions were: (1) That, even from coals poor in gas, a gas of which the average composition was hardly lower than that from many gas-works, there could be obtained—

	Gas from Coke-Oven. Per Cent.		Gas from Municipal Works of Westphalia. [?] Per Cent.
Carbonic acid	1·4	..	1·70
Oxygen	—	..	0 60
Carbonic oxide	6·6	..	7·10
Heavy hydrocarbons	3·2	..	9·00
Methane	25·0	..	28·62
Hydrogen	56·4	..	52·72
Nitrogen	7 4	..	6·11

(2) that gas-works ought to take their inspiration from coke-ovens, which in colliery districts could supply towns with illuminating gas; (3) that gas-works might profit by learning from coke-ovens. The deterioration of gas in coke-ovens was caused less by the large bed of incandescent coke than by the bad gas remaining in the coke. Gas-retorts might be replaced by gas-ovens in suitable form. For forty years gas-retorts were made the models for coke-ovens. Now it was the reverse.

At the congress of the German Association at Mannheim, in 1907, Herr Ries, of Munich, described the Munich installation of five beds each having three chambers or ovens, which had worked continuously for eight months. In 1895 he had said it seemed that coke-ovens supplied the model for all the requirements of a gas-oven. At Munich, the main object is to produce a gas of more regular composition than that obtained from coke-ovens. The chief objections to amalgamating coke-oven and gas-works practice have been that the coke-oven partakes of a general industrial enterprise, and in case of strikes or interruption the public supply of gas might suffer; and that such working would almost quadruple the present tonnage of coke, which is already difficult to dispose of. One feature of the Munich plant is the possibility of completely filling the ovens, and of regulating their heating so as to have uniformity on the two sides and top. The ovens are in threes, and form large inclined retorts. Between the burnt-off charge and the oven sides there is a space of 10 mm. to 15 mm.; and the coke slides out assisted by a travelling pusher. The charging takes from 20 to 30 seconds; and the charges of Saar coals are burnt off in 24 hours. Durham coals would take at least 30 hours. Each chamber contains 2½ to 3 tons of coal, and the whole oven produces 2800 to 3000 cubic metres (from about 98,800 to 106,000 cubic feet) per day. The working of the five ovens is done by four men. The charging of 2½ tons of coal into a chamber at a temperature of 1200° C., it might be thought, would at once cause to be given off a considerable volume of gas, which would fall away to nothing. But the working at Munich has proved that this is not so. The average make of gas has been 32·84 cubic metres per 100 kilos. of coal; the heating power ranges from 8000 to 4000 calories; great variations in illuminating power, the average being about 12 Hefner candles; coke made, 67 per cent.; tar, 6·41 per cent.; coke fuel, 15 per cent.

Other similar installations in Germany are at Hamburg, where a bench of ten ovens, each of 5000 cubic metres (176,600 cubic feet) capacity, has just been put into working; and at Leipzig a bench of 6000 cubic metres (212,000 cubic feet) ovens is now in course of construction. In France, the Société du Gaz de la Banlieue de Paris are constructing at Gennevilliers two benches of 3000 cubic metre (106,000 cubic feet) ovens.

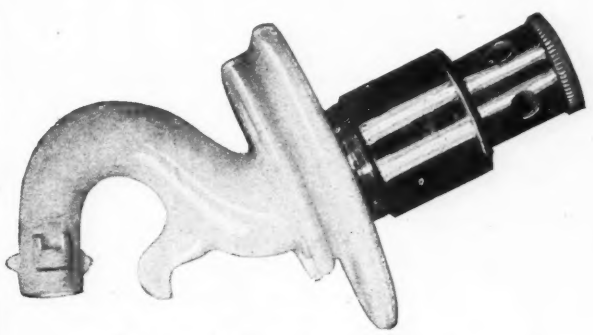
It would be premature to try to make a comparison between the different systems of carbonization which have been described. The question of first cost is of great importance; but there are many other considerations. The gas engineer to-day has before him a series of new appliances, between which he must decide according to circumstances. If horizontal retorts with machines and inclined retorts have rendered great service to the gas industry in recent years, and by reason of economy have justified their maintenance, without doubt the new systems are ripe for application, where large installations have to be put up, and where capital has to be expended to meet growing demands. We are assisting at a transformation—considered by some technicians to be a revolution—of the methods of the manufacture of gas.

Upon the conclusion of M. Marquisan's paper, which was relieved by photographs, drawings, and diagrams, the President of the meeting (M. Barbet, Vice-President of the Société des Ingénieurs Civils) warmly thanked him for an essay so full and detailed. It showed, he said, that in the gas industry, as in every modern industry, engineers were seeking to arrive at continuity of operations with a view to reducing prices and costs of labour.

OFF BEATEN TRACKS.

The New "Metrolite" Inverted Gas-Burner.

GREAT as have been the advances in inverted incandescent gas-burners, there has been one outstanding drawback to some of the patterns on the market. This drawback, it need hardly be mentioned, is that the heat from the burners has tarnished the metal work above, and the action of the products of combustion upon metal in which there is copper has caused an incrustation to develop. Tarnishing and incrustation are both eyesores, and produce labour. There have been more or less successful expedients introduced to obviate this. But now we have an entirely



No. 3 Type "Metrolite" Burner (Exact Size).

Showing the Ease with which the "Metrolite" Globes are fixed.

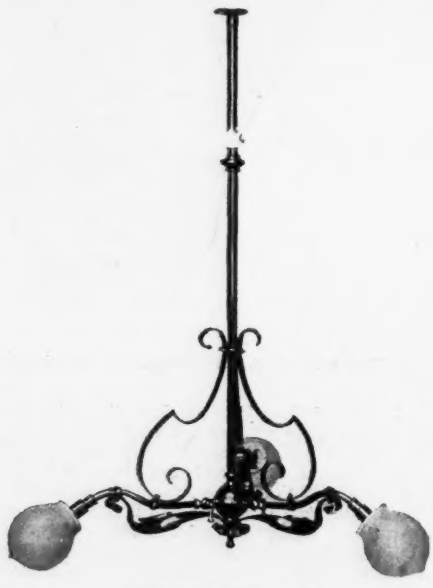
new type of burner, designed, in the first place, to escape any destructive and unsightly influences upon metal work, but with the secondary though important advantage that it has opened up quite a new line in the design of artistic fittings. Off the beaten track is the new "Metrolite" burner, which has been patented by Messrs. A. L. Dunphy and J. Tysoe; and it is a burner that will without doubt, on its merits, score a full share of success. An abstract of the patent specification appeared in our "Register of Patents" on Nov. 26 last; but, after the manner of patent specifications, it did not make any real impression on the mind as to the range of possible effect the new burner in fact possesses.

It must be borne in mind that the initial object of the burner is to do away with the eye-distressing tarnishing of gas-fittings; and this is accomplished by a combination of ideas in design: First, by making the burner (from the nozzle) of glazed fireproof porcelain, with no metal inside the globe, by curving this porcelain part in such manner, according to the angle at which the burner is to be placed, that the mantle hangs vertically, and allows no

direct heat to get to the brass fittings; and by constructing the porcelain part with a flange of the same material between the curved tubular portion and the metal parts composing the mixing chamber and the gas and air inlets. A study of the three types of bijou-sized burners so far made, shows a comprehensive consideration of the details so as to meet requirements. One design of burner is for use with fittings at an angle of 22½° upwards, the second with fittings where the arms are at right angles, and the third with fittings pointing downwards at an angle of 22½°; or each design of burner can be used on existing vertical or inverted fittings by the use of special but very simple and inexpensive adaptors. It is type No. 3 that we show for pointing downwards. From this illustration will be distinctly seen the part of the burner that is made of glazed fireproof porcelain, and how completely all metal portions have, by the design, been removed from direct contact with heat and out of the path of the products of combustion; and confirmation of this will also be obtained from the other illustrations. The shape, the details of that shape, and the material are the chief points about what is otherwise a very simple burner. At the nozzle of the burner, it will be seen that there are lugs cast

A Three-Light Bracket.
[Mantles all Vertically Suspended.]

for carrying the mantle. Underneath the curved swan-neck part of the burner is a tongue, the object of which is to serve as a guard to the mantle when the globe is being fixed in position, as illustrated. Then we come to the flange. This is so grooved, and the special globes used for these burners are so shaped at the



A Three-Light Pendant.
[Mantles all Vertically Suspended.]

connecting opening that, by a mere quarter turn of the globe, it is, without screws, springs, or any other fixing adjunct, securely locked in position. The porcelain part of the burner simply slides into a brass socket in the casing of the mixing chamber, and is there held in position by a spring clip. The whole is so simple, and so quickly taken to pieces, that cleaning and maintaining in

The Globe Fixed, with Outlet at Top.

a high state of efficiency will be an easy matter, and certainly not a great time-absorbing one.

Full advantage has been taken of the fresh latitude that the burner gives to new design in fittings and globes; and there are most artistic special productions to be had, both in brackets and pendants. We illustrate one of the special three-light brackets and a three-light pendant. If these will not please, then it will only be in the case of those individuals with whom nothing is right. Be it remembered, however, that, though the burners on the brackets are projected up in the air as they are here, the mantles are all hanging in vertical position. There has also been a departure, it will be remarked from the example, in the shapes of the globes; and among them there are several charmingly decorated. But with all the novelty there is about these burners, the prices at which they are being retailed, we are glad to see, bring them within the reach of all. Ordinary bijou mantles can be used with these burners, and though the fittings and globes are at an angle, the mantles are *always* suspended vertically. The advantage of this will be realized. The efficiency of the burner is excellent; the illuminating power being about 30 candles per 1¼ cubic feet of London gas.

The General Brass Fittings Company are the sole makers of the burner; and the Laddite Mantle Company are at present the wholesale agents. The burners at the various angles, single on bracket fittings and in clusters on pendants or brackets, can be inspected at the stand of the latter Company at the Franco-British Exhibition; and there will be but one opinion resulting from the examination—that the burner is one that possesses intrinsic value for the gas industry. both on account of its artistic effects and the protection that it affords to the metal fittings upon which it is employed.

Mr. J. N. Derbyshire, Chartered Accountant, of Nottingham, has been appointed Chairman of the Shirebrook and District Gas Company, in place of Mr. R. F. Vallance, who died lately. Mr. Derbyshire is also Chairman of the Draycott Gas Company, and a Director of the Southwell District Gas Company, Limited.

Visitors to the Franco-British Exhibition will notice, in the neighbourhood of the Machinery Halls, a glass house containing the productions of Messrs. Thomas Webb and Sons, Limited, of Stourbridge. In this house will be found a small exhibit of fire-bricks by Messrs. John Hall and Co., of Stourbridge, who supplied Messrs. Webb with the pots, fire-bricks, and fire-clay used in the glass-furnace erected by them; and they have prepared for distribution to visitors an attractive little pamphlet, printed in colours, showing their gas-retorts and other fire-clay goods.

"Profit-Sharing and Co-Partnership for Workmen" is the subject of an editorial article in the current number of the "Builder." The article is headed by the following quotation from John Stuart Mill: "Capitalists are almost as much interested as labourers in placing the operations of industry on such a footing that those who labour for them may feel the same interest in the work which is felt by those who labour on their own account;" and the writer traces the progress of the co-partnership movement from its inception in 1889. His concluding remarks are as follows: "Reviewing all the work which has been done with the object of making labour more interesting than a mere wage-earning operation, we think it must be conceded that the greatest measure of success has been attained by profit-sharing accompanied by compulsory investment of the profits in the concern for which the operative labours, or in some form of Government security, and not by what are known as co-operative societies. . . . The average operative is not yet fit to be entrusted with authority equal to that acquired by masters of industry or merchant princes in the supervision of the operations which bring food and wealth to the community. He still requires a master and adviser. He must learn many things before he can be regarded as qualified to occupy a position of control. But Sir George Livesey has given to the world a practical demonstration on a large scale of the methods by which operatives of all classes may be induced to take a lively interest in their own work and in that of their fellow-workers, and by which, as a result of their own labour, they may pass into the ranks of capitalists. Truly, a notable achievement."

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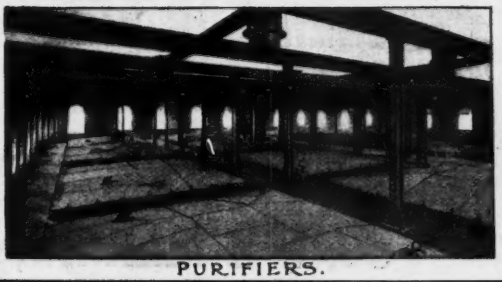

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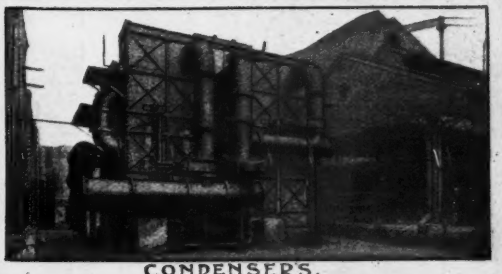

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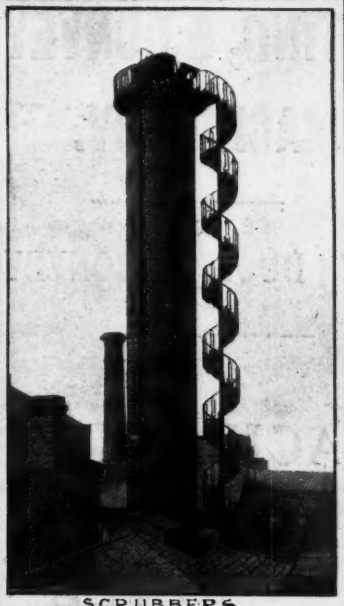

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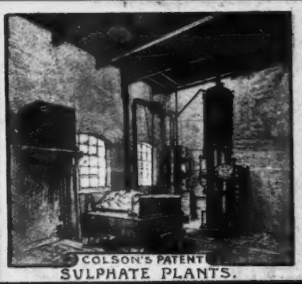

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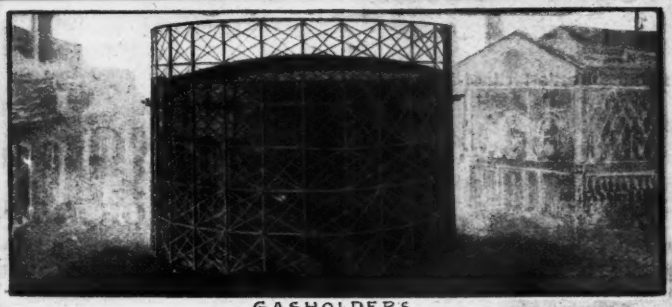

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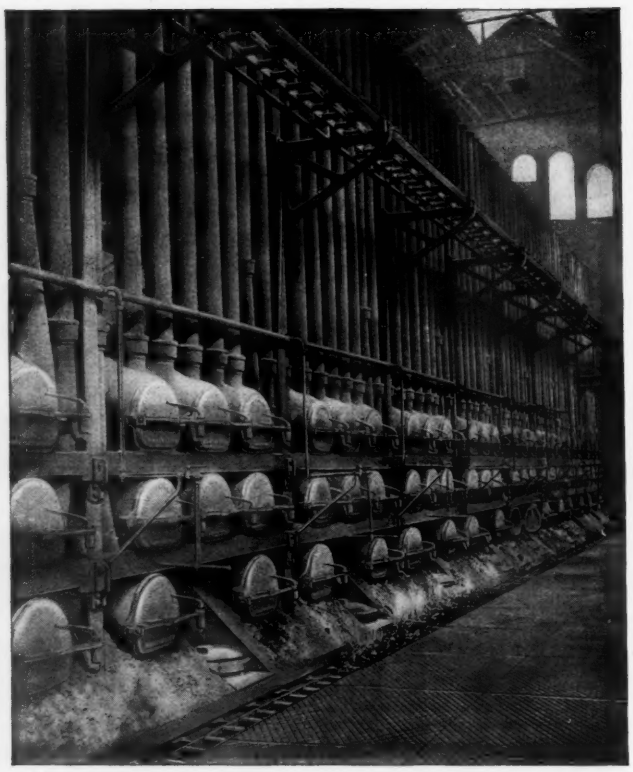

Interior showing West's Inclined-Retort Settings and Coke-Conveyor.

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AN INTERNATIONAL ACETYLENE CONGRESS.

On Thursday, Friday, and Saturday of the week before last, there was held in the Chemical Society's Rooms, at Burlington House, Piccadilly, the Fifth International Congress for Acetylene and Carbide of Calcium, with which was incorporated the Fourth Meeting of the International Committee for Acetylene and Carbide of Calcium, and the Seventh Annual General Meeting of the British Acetylene Association.

A Hearty Welcome.

Sir William Ramsay, K.C.B., LL.D., F.R.S., occupied the chair at the commencement of the proceedings, and briefly addressed the delegates. He said he had to thank the congress for the honour done him in asking him to give some words of welcome. He fancied that this honour had been conferred upon him in his capacity of chief representative of chemistry in England for the moment, as the President of the Chemical Society, in whose rooms they were glad to welcome those present. But this was, if he might say so, not his only claim to occupy the position. He would like, if they would allow him, to give them some account of very early experiments indeed with which he was concerned, or of which he was a witness, dealing with acetylene. It was in 1877 that he was fortunate enough to show that if acetylene and hydrocyanic acid were passed through a red-hot tube the product was pyridine, one of the coal tar bases. In those days, acetylene was not easily made. If he remembered rightly, it was chiefly prepared by doing what was abhorrent to all chemists—making a bunsen burner "burn below," and then aspirating the gases through a solution of cuprous chloride in ammonia. A red precipitate was formed in small quantities; and by continuing the operation for a time, a sufficient amount was accumulated to treat with hydrochloric acid, and so obtain a few litres of acetylene. This was the old-fashioned method. There was another plan which he had also tried, but not with so much success; and this was to pass vapour of chloroform over red-hot copper. The chlorine formed chloride of copper; and the two carbon atoms linked together forming acetylene—thus H – C≡C – H. Now to take up the tale a little further on, when he came to London in the year 1887 to succeed Professor Williamson, he found that Dr. Plimpton was established there as assistant; and he became his (the speaker's) assistant. He also had been working with acetylene. He obtained it by the aid of a refractory bunsen burner; and he prepared numbers of compounds of acetylene, with silver, with mercury, and also with copper. One of the mercury compounds appeared likely to prove of commercial value. It was, he thought, obtained by passing acetylene through mercurous acetate. The result was to give a curious compound —a white powder consisting solely of mercury and carbon, which was violently explosive when dried. Dr. Travers joined Dr. Plimpton at that time; and they patented this compound, in the hope that it might displace the usual fulminate of mercury in the manufacture of detonators for high explosives. This hope was disappointed. The substance was easily made; but it proved no better than ordinary fulminates, and not quite so easily kept in a state free from decomposition. These experiments led Dr. Travers to try and find a simpler method of making acetylene. He (the speaker) well remembered his heating up in an ordinary fire a mixture of calcium chloride, metallic sodium, and powdered charcoal or coke. In this way, carbide of calcium was produced, and, on the application of water, acetylene. This was not, however, commercially practicable, because it required sodium—an expensive material at that time. A little later on, he (Sir William) was in constant communication with his friend M. Moissan, when he began his experiments on high temperatures. He was much attracted by the generosity of the Electrical Companies of Paris in placing at M. Moissan's disposal during the early hours of the afternoon relatively enormous currents for the operations in his electrical furnace. Needless to say, he (the speaker) was anxious to imitate these experiments, and tried to get similar facilities in London, but without success. No company would hear of having any chemical material placed in their works, or of starting their engines some ten or fifteen minutes before the ordinary time. They thought their duty to the shareholders completely precluded the offering of any such sops to Science. In 1897, he saw fairly large carbide works at Niagara. Now they would see that, though he was no doubt a rank outsider from their point of view, still he had been connected to some little extent with the very small beginnings of the experiments which had turned out such a tremendous commercial success, and which had really brought in what one might call a new method of lighting, and which promised to lead to an almost complete revolution in agriculture. In his own name, as President of the Chemical Society, and in that of their English *confrères*, he bid the delegates a hearty welcome, and hoped they would have a profitable time in listening to the papers and exchanging views. He believed, however, that the chief use of a congress like this was not so much the giving and receiving of information as the making of friendships.

Before he left the room, a cordial vote of thanks was accorded to Sir William Ramsay for his address.

Mr. Charles Bingham was then elected Chairman of the congress; while Mr. Lacey Downes (the Secretary of the British Acetylene Association) and M. Pierre Rosemberg (of Paris) officiated as Secretaries.

Subsequently, the consideration of papers was proceeded with. These were generally read in the native tongue of the author; and the same remark applies to the speakers in the brief discussion that took place in regard to one or two of the communications. An indication is given below of the contents of some of the papers.

Estimating Impurities, &c., in Acetylene.

Mr. J. W. Gatehouse, F.I.C., Chemist to the British Acetylene Association, read the first paper, on a "Method for the Estimation of Certain Substances Produced during the Combustion of Acetylene, &c." He remarked that the haze produced during the combustion of acetylene obtained from certain samples of calcium carbide was generally attributed to the presence of phosphoretted hydrogen, producing phosphorus pentoxide on combustion. While admitting that the phosphorus held a prominent place in the production of this haze, he said the influence of silicon was also most pronounced; while sulphur had in some cases to be taken into consideration. He then described a method devised to collect and estimate the substances actually given off by the flame of an ordinary acetylene burner, which method was an adaptation of that used by the Gas Referees in the estimation of sulphur in coal gas by combustion. To fit the apparatus for use in acetylene work, the burner had to be modified; and as acetylene produces very little liquid during combustion, water was allowed to drop through the apparatus, so as to keep the marbles constantly moist. Ultimately, the marbles in the condenser were replaced by water surrounding a spiral or sinuous glass tube, which passed water-tight through the constriction in the body of the condenser, and was connected above with the long glass chimney by means of a short piece of india-rubber—thus securing an uninterrupted draught through the apparatus from the combustion chamber. About 300 c. c. of water were allowed to drop through this tube during the whole time of combustion. An ordinary acetylene burner was employed, of any capacity from 10 to 30 litres per hour. The combustion chamber was a glass bell jar connected with the condenser by means of a glass tube bent at right angles. The combustion chamber was closed at the bottom by a glass or other tray having a hole in the centre for the burner to pass through. From 50 to 100 litres of gas having been consumed in the combustion chamber, this was allowed to cool, and then the whole apparatus was washed—first with the water which had been collected in the beaker placed below the condenser, and then with distilled water; about 400 c.c. being the ultimate amount. This acid liquid was next titrated with decinormal soda solution, in order to find the total acidity in terms of standard alkali; the indicator used being phenolphthalein. This acidity would be found to vary with the gas from different samples of carbide from 20 up to as much as 100 c.c. of decinormal soda for 100 litres of gas burnt. They might next, said the author, proceed to estimate the phosphoric acid in any convenient way, taking care to first separate the silica. Add hydrochloric acid to the neutral liquid, and evaporate to dryness, adding a few drops of nitric acid towards the end. Re-dissolve in very dilute acid, filter off, and estimate the silica. Precipitate the phosphorus from the filtrate, after making it alkaline with ammonia, as magnesium pyrophosphate, and calculate into the equivalent weight of phosphine or phosphorus, as desired. Sulphuric acid might be estimated in the filtrate, if the magnesium mixture had been prepared from pure magnesium chloride. In conclusion, he suggested as a new limit for the purity of acetylene that the maximum acidity produced by the combustion of 100 litres of the gas should not be greater than that which would perfectly neutralize 45 c.c. of decinormal soda, using phenolphthalein as an indicator. This he put forward as an alternative to the present standard of 0·06 per cent. by weight of phosphine. It embraced more impurities, was far more easy of estimation, and could be attained by the carbide manufacturer with as great facility as the present standard of purity.

Dr. Paul Wolff asked whether Mr. Gatehouse had ever found such an amount of silicic acid that he could determine its quantity.

Mr. Gatehouse said certainly he had in many cases. There was, however, a grave difficulty about the determination of silicic acid in combustion of acetylene. One was never quite sure that a portion of the silicic acid had not been derived from the apparatus. There was just this little doubt; but allowing that doubt to remain, he had found from 0·0085 to 0·024 gramme of silicic acid from 100 litres of acetylene when burnt. As he had said, there was, of course, the doubt how much came from the apparatus and how much from the acetylene. It was easy enough to get the silicic acid; but it was not easy to determine what proportion came from the apparatus itself.

Formation of Haze from the Combustion of Acetylene.

Professor Dr. A. Fraenkel, of Vienna, read a paper on "The Formation of Haze from the Combustion of Acetylene," in the course of which he said that the phenomenon of a disagreeable and unhealthy haze arising from the combustion of acetylene has been the subject of repeated investigations, and broadly it has been shown that in most cases the haze only supervenes when the gas is insufficiently well purified. Better purifying arrangements generally get rid of the trouble. But there were certain cases not so readily disposed of; and an abnormal quality or character of some lots of carbide was alleged to account for the haze. P. Wolff examined a large number of such "abnormal" carbides,

and reported that he never could trace from them other impurities than the usual sulphuretted and phosphuretted hydrogen. His search for other specially poisonous impurities, such as siliciuretted or arseniuretted hydrogen, had a purely negative result. But he found that, when a haze arose from the combustion of gas which had been purified in the usual manner, the amount of phosphuretted hydrogen in the crude gas was exceptionally high—ranging from 0·10 to 0·15 volume per cent., compared with 0·02 to 0·05 per cent. ordinarily. Moreover, some purifying agents—*e.g.*, puratylene—failed anyhow to get rid of the haze, while others, such as acagine, heratol, and purol, furnished a pure acetylene, provided they were used in sufficient quantity and with proper surface contact. Caro investigated the matter with entirely different results. He found that the abnormal carbides invariably contained large quantities of readily decomposable silicides, but that considerable heating during generation was necessary for the production of haze-making gas. Local heating of the carbide during decomposition caused the formation of organic silicon compounds, which were not removed by purification; whereas at a low temperature only siliciuretted hydrogen, which was abstracted by the purifying agents, was formed from the silicides in the carbide. He collected the haze by aspiration through moistened filter paper, and found that it was almost wholly silicic acid, and not phosphoric acid; and he concluded that the formation of haze was due not to the presence of abnormal constituents in the carbide, but to the quantity of normal impurities and the mode of decomposition employed. Finally C. Hoffmeister reported that he had obtained from purified acetylene, by absorption of the acetylene in acetone or by ammoniacal copper solution, a residue which burnt with an intense calcium flame and produced white clouds of lime. He supposed it to be a calciuretted hydrogen. The author had occasion recently to examine a carbide from which the gas gave on combustion a cloud of vapour and a smell of burnt dust. This gas destroyed Welsbach mantles so rapidly that they required almost daily renewal. A deposit which the gas had produced on the copper reflector of an acetylene stove was collected and analyzed. It was found to consist of phosphoric acid 51·07, cupric oxide 7·84, ferric oxide 19·15, and water 17·51 per cent., and to be free from silicic acid and to contain only traces of lime. The copper clearly was derived from the material of the reflector, and the iron must have had a similar secondary origin. Thus only the phosphoric acid could have been responsible for the haze. Two samples of the carbide which produced this gas were examined and found to afford from 0·0672 to 0·0837 volume per cent. of phosphuretted hydrogen. The composition of the purifying material which had been used could not be definitely ascertained, as it had been changed by the supplying firm; but the position of the purifier between the washer and the gasholder was in any case unsuitable. The generator was on the carbide-to-water system. The case supports Wolff's assumption that the formation of haze is due to phosphoric acid resulting from a large proportion of phosphorus in the carbide, and inadequate purification. It does not confirm either Caro's or Hoffmeister's observations.

The Improved "Manchester" Burner.

Dr. Marc Létang read a note on the improved "Manchester" burner. He pointed out that this type of burner, which is very extensively employed in the gas industry, is also one of those generally used for lighting by acetylene. As is well known, two jets of gas are projected against each other, and the result is a large flame shaped like a butterfly. The author thought it would be interesting to see whether, among the earliest examples of this burner, there were any which combined a supply of air, as devised by Bunsen, with this conjunction of jets. Such a combination would be specially suitable for the combustion of gases rich in carbon, like acetylene, and the drawing in of air would prevent the obstruction of the orifices whence the gas issues. He thought the Legris burner, which was invented about half-a-century ago, fulfilled these requirements. Dr. Létang gave an illustration of this burner, accompanied by a few particulars in regard to its construction. He pointed out that, in making it, it was necessary to confine oneself to the use of refractory materials for the parts coming in contact with the heated gas, inasmuch as all metals tend to cause polymerization of the acetylene, and the almost immediate obstruction of the burner. By the use of steatite, the Legris burner works perfectly regularly, and gives exceedingly good lighting results. These, however, are affected by the angle at which the jets of gas issue; and consequently the 90° usually adopted has been abandoned for 65°. The distance between the two orifices may be fixed at 10 mm. (0·4 inch), and then the base of the flame will be 3 mm. (0·12 inch) above the *lamellæ* surmounting the burner, and no deposit of carbon will be formed. The author came to the conclusion that from the photometric and photogenic points of view, as well as from its inalterability and simplicity of construction, the Legris burner, though invented so long ago, is entitled to be considered not only as the first in point of date, but the premier in all respects, of the burners suitable for acetylene.

Acetylene Statistics.

In a short note, M. Pierre Rosemberg emphasized the value of statistics in such an industry as that of the production and supply of acetylene gas; and he related how proposals had been made to the various Associations, and subsequently to the International Committee, to adopt, in stating particulars in regard to towns lighted by acetylene, a uniform tabulation furnishing only the most useful data—viz., the name of the town, province, or department, the length of mains, the number of inhabitants, consumers, public lamps, and burners, and the price per cubic metre of gas. He said a table comprising 350 towns in various countries had been compiled; and it was hoped that in a short time a complete list of the rest would be prepared. He pointed out that what had been done in regard to the lighting of towns, which was only one of the applications of acetylene lighting, might also be carried out in connection with private installations, accidents, new inventions, &c.; and he thought that if, in each country, a certain number of acetylenists could be found willing to make themselves acquainted with what was going on, and communicate their information to the International Committee, the latter would be in a position to do useful work by bringing the particulars furnished to the knowledge of all, and causing them to be inserted in the papers specially suitable for giving them publicity. It was considered that the holding of the congress would afford a good opportunity for discussing the subject, and for urging acetylenists to respond to the International Committee's appeal for particulars, and to thereby assist in popularizing the industry.

While on the subject of statistics, it may be mentioned that M. Granjon presented a large table giving particulars of 10,000 installations of acetylene inspected by the staff of the Union des Proprietaires d'Appareils à Acétylène. They were obtained from eight districts—viz., Bordeaux, Lille, Marseilles, Nancy, Nantes, Paris, Rouen, and Toulouse, and covered the period from 1897 to 1906-7.

The Moilet-Boistelle Gas-Mixture Regulator.

M. Lacroix read a paper, illustrated by diagrams, describing the application to acetylene lighting of the Moilet-Boistelle gas-mixture regulator (*doseur-mélangeur de gaz*), which is being exploited by the Compagnie Universelle d'Acétylène in Paris. The apparatus was the subject of a paper presented to the Paris Congress in 1900, as well as to that held in Liége in 1905. Since then the results previously achieved with it have been maintained; and it is stated that the above-named Company do not fit up an acetylene installation of any importance without completing it by adding a gas-mixer. The appliance has two crowns, each divided into a certain number of identical cells (five or six, according to the size of the mixer), terminating in inlet and outlet tubes. The crowns are completely isolated by a diaphragm. The mixer is mounted upon an axis round which it can turn freely, and is contained in a case similar to that of a gas-meter. Assuming the crowns are so constructed that their volumes are respectively 70 and 30, on acetylene gas entering the former it will begin to turn, and discharge the gas into the casing common to the two crowns. By this movement it will draw with it the other crown, which, being in communication with the atmosphere, will convey air into the casing, the respective volumes of acetylene and air in which will always be proportionate to the volumes of the crowns, whatever may be the speed of the apparatus. However large or small the quantity of gas delivered, the proportions of the mixture supplied will always be constant. Not only is the mixer applicable to acetylene lighting by naked flames, but it may be employed for incandescent lighting. It was this fact that prompted the author to bring it before the congress. As with ordinary gas, it is high temperature that is specially required in this case; and this will depend upon the composition of the mixture of acetylene and air burnt under the mantle. It is necessary to introduce into the mixture at the point of consumption as large a quantity of air as possible; and even the best bunsens have been found not to draw sufficient for producing perfect combustion of the carbon contained in the acetylene. The mixer described in the paper enables this difficulty to be overcome, as the author demonstrated. He claimed that in the case of incandescence, as in that of direct combustion, it obviated one of the principal defects of acetylene—viz., its very great richness in carbon.

The "O. C. A." Incandescent Burner.

M. Held, of Paris, read a paper on the "O. C. A." incandescent acetylene burner, which, he said, possesses many advantages, apart from the lighting power obtained, which is very much the same for all incandescent burners of good make. The Central Acetylene Office, after studying the essential requirements for incandescent acetylene lighting, decided upon what, from their point of view, were the best conditions for the utilization of the system; and the "O. C. A." burner is the result. Practical tests, it was claimed, had proved that the arrangement was in all respects an excellent one. Steatite, which has already been proved to possess great advantages for the nipples of other burners, on account of its durability, and the fact that it does not expand under the influence of heat, is also employed for the injector of the "O. C. A." burner. The cone of the injector and the other parts are of simple yet strong construction. The wire gauze which is used in other burners is here replaced by a spiral spring, which serves the two purposes of mixing the acetylene and air and preventing lighting-back. The doing away with the wire gauze had for its object the obviating of the choking and rapid deterioration to which burners so fitted may be liable, and of simplifying the operation of taking apart for cleaning. The spring can be detached, cleaned, and replaced with the greatest ease. In addition, the burner can be entirely taken to pieces, and all parts are accessible. There is fitted on the burner a gallery (which is claimed as one of the features of the arrangement) into which the mantle, suspended from a rod, is fitted, without,

however, resting on the bottom of the gallery. By this means the life of the mantle, it is anticipated, will be considerably increased. The burner is used with a globe, but without a chimney.

Other Papers.

Other papers presented included the "Manufacture of Mantles for Incandescent Lighting by Acetylene," by M. Cadenel, of Paris; "Impurities of Acetylene, their Determination and their Elimination," by M. Maricheau Beaupre, of Paris; "Illumination by Acetylene of the Locomotives of the Gothard Railway," by Dr. E. Schumacher-Kopp, of Lucerne; "Acetylene Lighting in Mines in France," by M. Pitaval, of Paris; and "Autogenous Soldering, and Some Experiences therewith," by the Société des Applications de l'Acetylene.

The Lighter Side.

In spite of the length of the business programme, ample opportunity was found for fraternizing between the members. On Thursday afternoon visits were paid to the premises in Victoria Street of some of the firms engaged in the acetylene industry; and on Friday evening there was an official dinner at the Trocadero, to which a company of considerably over a hundred sat down. Then on Saturday there was a motor-car trip to the residence at Carshalton of Mr. F. S. Thorn, the President of the British Acetylene Association; while for Sunday there was a steam-launch excursion up the Thames from Windsor.

The Next Congress.

Mr. Bingham was heartily thanked for presiding; and it was decided that the next conference should take place in Vienna in 1910.

Annual Meeting of the Acetylene Association.

The Annual General Meeting of the Acetylene Association was held on Friday, May 29—the President (Mr. F. S. Thorn) in the chair.

The Accounts.

The Secretary (Mr. Lacey Downes) read the accounts and the Auditors' certificate. The former showed receipts, including the sum brought forward, amounting to £168, and a balance, after meeting expenditure, to carry to the next accounts of £10 8s.

The President, in moving the adoption of the report and accounts, said the subscriptions in 1907 showed 75 members, 14 of whom were ordinary; while in 1906 there were 66 members, 18 being ordinary.

Mr. Charles Hoddle seconded the motion; and it was agreed to.

The Name of the Association.

The President, referring to the past year's operations, said it was distinctly a matter for congratulation that the Association had so promptly carried out the wish expressed by the members last year that the annual meetings should be held later in the season than February. The fifth international congress now being held marked an epoch in the industry in this country; and the hearty reception their friends were getting, was a proof that the Association appreciated to the full all they had done and were doing to advance the interests of acetylene. The arranging of the congress programme had entailed a vast amount of work, especially on Mr. Bingham and Mr. Downes; and he was sure they would all approve of the election of the former as Chairman of the congress. A point had arisen with regard to the name of the Association, which, of course, was not the only organization of its kind in existence. There were other similar bodies abroad; and therefore he was going to submit a resolution that it be an instruction to the Executive Council to forthwith take steps to comply with the legal formalities by calling extraordinary meetings, and to follow such procedure as was necessary, for changing the name of the Association from the Acetylene Association to the British Acetylene Association, or such other name as might be permitted by the authorities and approved by the members.

Mr. L. Thurnauer seconded the proposition.

Mr. Hoddle moved, and Mr. Gore seconded, an amendment that the matter be postponed until such time as they might well apply for permission to call themselves the Royal Acetylene Association.

The amendment was, however, lost, and the original resolution was agreed to.

Imports of Carbide, and Other Matters.

The President remarked that at the last meeting reference was made to the scarcity of carbide; but he could now congratulate the trade upon a plentiful supply during the past lighting season. He had received an interesting report from the Statistical Office of the Customs House, giving the imports and exports of carbide with regard to this country in 1907. The figures were most momentous. The imports for the past five years were as follows: 1903, 62,000 cwt.; value, £50,900. 1904, 70,000 cwt.; value, £49,600. 1905, 129,000 cwt.; value, £81,000. 1906, 128,500 cwt.; value, £79,224. 1907, 235,600 cwt. (11,781 tons); value, £151,000. Thus last year's figure was more than double the amount for 1906; but, of course, there were extraordinary circumstances to account for the heavy increase. Towards the end of 1906, they could not obtain enough carbide; but at the beginning of 1907, it commenced to come in more rapidly. However, there was a wonderful increase in the amount of carbide imported and sold in this country, which was most gratifying. The exports were quite small; and he would not trouble them with the figures. Speaking of carbide, a very important English manufacturing company had been formed, and was actually in working order; and he wished the enterprising promoters every success. As to the licensing regulations, the Executive heard of very little friction regarding them; but cases of individual hardship occasionally occurred; and it was an open question whether some further modification should not be applied for. The industry was advancing in all directions; and the increasing use of acetylene in the motor and engineering trades was most noticeable. The returns he had quoted with regard to the sales of carbide proved that acetylene was not standing still. They must, however, continue to improve, and must not rest satisfied with the nearness to perfection to which they had attained; for they had tremendous interests opposed to them. Incandescent acetylene burners did not appear to have yet made very great progress; but doubtless developments would take place; and in all probability these burners would be used for acetylene comparatively as much as they were for coal gas. An invitation from Mr. Imre Kiralfy to light a large portion of the Franco-British Exhibition gratuitously had had to be declined by the Council for obvious reasons. But it was hoped that in the near future an acceptable scheme for an exhibition would be formulated, and the Council would be pleased to receive suggestions from the members to this end. Their thanks were due to Sir William Ramsay for his kindness in attending the reception on the previous day. The death would have been noted with regret of Dr. Leeds, who was a clever chemist, and a great authority on acetylene. His numerous contributions and editorials to the "Acetylene Journal" were most instructive; and the book on acetylene which he wrote, in conjunction with Mr. Butterfield, was regarded as the standard work on the subject, not only in this country, but all over the world.

Votes of Thanks.

Votes of thanks were then accorded to the Honorary Solicitors (Messrs. Batten, Proffitt, and Scott), the Honorary Auditors (Messrs. Fitzpatrick, Graham, and Co.), the Council of the Chemical Society (for having placed their rooms at the disposal of the Association for the meetings), and Mr. Raggett, the Publisher and Proprietor of the "Acetylene Journal."

Acetylene v. Petrol or Air Gas.

Mr. Charles Bingham then submitted a paper entitled "Acetylene *v.* Petrol (Air) Gas." In giving a *résumé* of it to the meeting, he remarked that for the past two years he had been endeavouring to persuade the Association that it was time to be up and doing, because, though personally he had no fear of petrol or air gas, such exaggerated statements had been made about its value that they were absolutely sure, unless dealt with promptly, to do some injury at any rate to the acetylene industry. He had one or two friends who had tried air gas; and he also had several customers who had employed it themselves or were acquainted with users of it. He thought, however, that by far the best means of getting at the bottom of the question would be to induce an independent person to write to all those gentlemen who had given testimonials in favour of air gas, and ask them to state plainly what their opinion of it was. Nearly all of them responded to the inquiry made; and the result of their communications was given in the paper. Everybody who had had anything to do with acetylene lighting knew perfectly well that the great claim of the air gas people was that air gas was extraordinarily cheap. Starting from the beginning—that was, the cost of installing the apparatus—they would find it clearly shown from the figures of the suppliers themselves, as quoted in their own price lists, that the cost of installing air gas was as a rule at least 50 per cent. more than that of putting in acetylene. This at once disposed of the assertion that it was cheaper to instal air gas. Then they would turn to the cost of running—because, after all, a little additional capital outlay would not matter much, if they were going to get it back by a much reduced cost of operating. On this point he had written to perhaps twenty users of petrol gas (without letting them know that it was anyone connected with acetylene who was making the inquiry); and he had also written to acetylene users. The result of the investigation was that petrol or air gas, when employed (say) in a country house, was dearer than acetylene; and there was little or nothing to fear from it, if they made known what were the merits and the demerits of the two illuminants. Then as to convenience, one might have the most brilliant light in existence; but it was of no use if it was too complicated for the servants. It was necessary to have something that everybody could use without too much trouble. One of the chief things that had to be pointed out was the difficulty in starting up an air-gas apparatus, unless the plant was a very small one, worked by weights. Even if only one room was required to be lighted, the engine had to be kept running all the same; and, as one user said, it was the running of the engine that ran away with the petrol. On the point of health, the author said: "This part of the subject I also divide into two chief heads—effect on the eyesight, and effect on the atmosphere of the room. As regards the former, I would like to point out that the supposed candle power of a light has little to do with its value, because all lights are composed of rays of different colour. Some of these

rays are useful; some useless; some, if anything, harmful. Now, the acetylene flame contains a far larger proportion of useful rays than the incandescent light used with petrol gas. I may also point out that, according to Vidal, an ordinary acetylene flat flame has more than three-and-a-half times the actinic value—candle for candle—of the Welsbach incandescent gaslight. But in this respect we have the advantage of the opinion of an impartial expert, Mr. E. F. Robson, who is Consulting Architect to the Local Government Board. He has publicly stated that, after an experience of twenty years, he places acetylene at the head of all lights for schools, because it is the best light for the eyesight. Both acetylene and air gas are, from the point of view of pollution of the atmosphere, far and away ahead of petroleum lamps, candles, and flat-flame coal-gas burners; but from the point of view of the oculist, acetylene is far ahead of all other artificial illuminants—and we use an artificial light to see by." As to general appearance, he said: "The acetylene light, the nearest to sunlight of all artificial illuminants, lends itself far better to artistic use, and shows persons and objects—and especially colours—in a far more favourable way than incandescent lights." In conclusion, Mr. Bingham remarked that the paper was really written for general distribution; and the Association wished to place it at the disposal of the members for this purpose.

Mr. Leon Gaster said he would have liked to have seen emphasized the effect of the different illuminants on the eyes. Statements had been much circulated that electricity or other illuminants were bad or good for the eyes; but speaking generally he would be glad to see more physiological investigation carried out. Doctors disagreed as to what was right and wrong. The subject of eye-testing was now engaging the attention of the Education Department; and it was receiving great consideration in America. When Mr. Bingham said acetylene lent itself far better to artistic use, and showed persons and objects—and especially colours—in a far more favourable way than incandescent lights, did he refer to gas or electricity?

Mr. Bingham: Both.

Mr. Gaster: That requires a great deal of justification. Continuing, he said the point he wanted to raise was that if they wished to insist that this particular illuminant—which he liked immensely—was better than anything else, they must prove it by scientific facts. If the subject were taken up physiologically, it would be of great service to the industry.

Mr. J. H. Ross cited a case that had come within his own experience, where the makers of an air-gas plant had stated the cost at 4½d. per 1000 cubic feet, and yet the cost under the supervision of their own representative was 1s. 10½d., and it was possible to run it up to a much higher figure than this. The machines he had seen were so arranged that it depended entirely upon the servant how much petrol was allowed in; and this was where the apparatus was defective.

Mr. R. J. Moss referred to the fact that petrol gas was not a true gas, and therefore was liable to dissociate when the temperature was reduced. During the past fifteen months, he had taken out three large gasoline plants; and he did not think there was a great difference between this and petrol gas, though, of course, the latter was an improvement. The reason why these three plants were given up was that in the summer they gave a splendid light; but in the winter things were different.

Mr. Chrystal asked what position petrol gas occupied as a heating agent. He had been told it could be used more cheaply and more easily for cooking than acetylene.

Mr. Bingham, in replying to the discussion, said, with regard to the remarks of Mr. Gaster, that the pamphlet was written for country people, to whom it was useless to submit a mass of scientific matter. In his opinion, there was no doubt that petrol gas was a much cheaper heater than acetylene; but there was a very small demand for this purpose.

The meeting closed with a hearty vote of thanks to the President, which was accorded on the proposition of Mr. Bingham, seconded by Mr. L. Wiener.

Municipal Traders' Contracts.

In our issue of April 21 (p. 148), there appeared some interesting points regarding the making of municipal traders' contracts, raised in a case in which Messrs. Bourne and Hollingsworth were the plaintiffs and the Marylebone Borough Council the defendants. The case went against the Council, and they appealed; and, what is more from their point of view, they succeeded. The success does not affect the question to which attention was specially directed in the article referred to—as to whether or not it is essential that a municipal trading undertaking's contracts with consumers should be under seal. All the precedents point to the contrary. In this case, it was a question of a breach of an alleged contract to supply electricity at a certain voltage by a certain day; and the question of the absence of seal to any contract was only one point made on behalf of the defendants. In the Court of Appeal, the defendants appear to have relied more upon the absence of authority to their officials to enter into contracts of the nature of this one. The Court of Appeal, in reversing the judgment of the lower Court, could not find that there was any definite promise to supply current at the specified voltage on the date named; and the Court could not discover any trace of authority in the Resident Engineer (Mr. Wilkinson) that warranted the making of a contract. Mr. Wilkinson has therefore had his powers in this respect defined by very high authority.

WAVERLEY GAS ASSOCIATION.

Ninety-Second Meeting in Edinburgh.

The members of the Waverley Association of Gas Managers held their Ninety-Second Meeting in the Concert-Room in the Scottish National Exhibition, Edinburgh, last Friday. There was a very large attendance.

Mr. T. O'Neill (Dunbar), the President, expressed his pleasure at seeing so large an attendance. They had with them, he said, gentlemen in the higher positions of the gas engineering world. Their presence gave a good moral tone to the Association; and in the name of the Association, he gave them a hearty welcome.

PRESIDENTIAL ADDRESS.

The President, in his address, said: I heartily thank you for the honour conferred by electing me President of the Waverley Association of Gas Managers. I need not here refer to the inception and traditions of the Association. These are already known, and worthily treasured. The ideas and the aims of the Association, engendered in the early days of gas lighting, have fructified and been of incalculable value. The recurring years have claimed many men of mark who were wont, by their presence, geniality, and ability, to contribute to what I may term the *bonhomie* of the Waverley meetings. Their work, efforts, and aims still live, and are recorded in the history of the gas industry. The majority of us in the Association are in charge of small works, and, to a great extent, our sphere is restricted. I would, therefore, wish to express some of my views to those similarly situated to myself.

The status of managers of small works has considerably improved of recent years. This has been due in no small measure to the individual genius of the leaders in the profession, by presenting the reflection and deeper view involved in the modern engineering and commercial aspects of gas manufacture and distribution. In these strenuous and creative times, we cannot over-estimate the work of those leaders of the Technical Press and the incomparable work of those men of science who have given us the bunsen burner, the mantle, the cooking and heating stove, and the gas-engine. These men have been potent factors in our industry—the silent workers in the research laboratories who have helped forward the captains of the industry, as well as the rank and file, in the material development of the modern phases of the use of gas. Environment plays no small part in effecting a stimulating emulation, especially in industrial centres. Commercial activity is quickened by keen competition; and gas managers are compelled by their surroundings to equip themselves with such knowledge as will conduce to their success in the race for supremacy.

Much that pertains to the introduction of machinery generally, while affecting the economics of the gas lighting industry as a whole, is not entirely applicable to the smaller undertakings; yet even with us a minor revolution has taken place in our methods. The finding of means to effect economies, which is vitally essential to the larger undertakings, also appeals to us, in a lesser degree. No doubt, we require to sit longer on the fence before adopting changes in existing systems; and there can be no doubt that the trend of the times indicates imminent changes in more than one direction. Those of us who have not the gift of originality, to discover or invent other and more economical means than those which we have acquired by general practice, can at least strive to popularize what comes first to our hand. We cannot all be specialists; but if we have, by experience and observation, cast off conventional methods in favour of methods with approved advantages, then we have contributed our quota to the march of progress. I presume we have all departed from the old axiom, "What was good enough for our fathers is good enough for us." This is clearly apparent if comparison be made of production per ton of coal now and two decades ago.

Time was when 5000 to 6000 cubic feet of gas was the usual yield per ton of coal. Now, not less than from 9000 to 10,000 cubic feet is looked for, and obtained. In the works of which I am in charge the quantity of gas made per ton of coal carbonized ten years ago was 8782 cubic feet; now it is 10,320 feet—an increase of 17·38 per cent. In the same period, the make of gas has increased by 109 per cent., the sale of residuals by 250 per cent., and the price of gas has been reduced by 31 per cent. This has been accomplished, too, with the same number of men as were employed ten or more years ago. Even with a further increase of 15 per cent. in the make, little or no addition to labour or plant would be required. All works experience this more or less, because, with a certain production, labour and plant are required that cannot very well be dispensed with, and yet they are possibly quite sufficient to meet double the production. Herein frequently the greatest economy occurs, because the interest, sinking fund charges, salaries, working costs, and rates and taxes are practically the same on the increased production.

Satisfactory as these figures are, especially in an agricultural district, other places can even better demonstrate the healthy condition of the industry. Until five years ago, I could not obtain an average of 10,000 cubic feet per ton of coal carbonized. The class of coal we used fully warranted such a production; and an agreement was entered into with the stokers whereby a bonus equal to 1s. per week would be granted to each when the average reached 10,000 cubic feet per ton, and a further bonus of 1s. per week when over 10,150 and up to 10,300 cubic feet. If above this average, the

bonus was to be further considered by the Gas Commissioners. The men now earn a bonus of 2s. per week each, due to their increased attention to the heats, their general work, and a careful scrutiny of the coal, including its condition when it comes into the works. As the stokers receive their bonus at the May term, it provides a good nest-egg towards the payment of their rents. Other works may use a class of coal which may not yield an average of 10,000 cubic feet per ton in working; but former results and experience will indicate to them a reasonable standard to adopt as a basis, in introducing such a scheme to quicken the interests of the men, with really tangible advantage to themselves and their employers.

I am one of those who have a firm belief in Newbigging's maxim, "Dividends are made in the retort-house." The problem of maximum production is not yet solved; but the minds of our prominent gas engineers are continually directed to the problem of the most efficient processes for use in carbonizing. I have already touched upon the marked improvement of carbonizing results in the smaller works. How can a further improvement be effected? Some system of regenerative firing is practically universal in most works. This is of primary importance. Second in importance is the proper arrangement of the retort-settings to meet the demand of the different seasons, with the object of obviating as far as possible intermittent work, as this has a baneful influence on general results. It is obvious that where (say) two settings of three retorts may be at work, probably one setting of four retorts would meet the demand. Such an arrangement would effect a saving of plant and labour, and give an increased yield of gas, by reason of continuous working; also a more regular illuminating power and a larger production of coke for sale. Another positive advantage is the saving of extra plant and labour in the use of a good class of coal for the smaller works. With coals giving a low yield per ton, a narrow margin in the yielding capacity might mean an extra setting of retorts in use; and the lower price at which the coal is obtained would not counterbalance the disadvantages. I believe in medium charges and in working the retorts alternately on each side of the oven, with four-hour charges during the period of maximum production, and always with an equal interval of time between each draw. I obtain, while the retorts are in full work, an average of from 9000 to 10,000 cubic feet per mouthpiece. The retorts are 8 feet long by 21 inches by 15 inches. Owing to the width of the house, I am precluded from putting in longer retorts.

Although I am an advocate of working high heats, in contradistinction to eminent findings on this subject, there are disadvantages attached to it, not the least being the trouble from thick tar pitching-up the hydraulic main, ascension pipes, and condensers; also a difficulty in pumping the tar from the tar well. This can be practically obviated where facilities exist to have a sufficiently long run of foul main to effect a gradual cooling from the hydraulic main to the condensers, and by the use of regulating valves. For a considerable time I experienced great difficulties through the pitching-up of the hydraulic main and condensers. Many times I have had recourse to bars in order to cut the solid pitch. By introducing a hydraulic main of much larger area, increasing the size of the foul main, using jumpers for pricking the ascension pipes, of nearly the diameter of the pipes, and by judicious mixing of the coal, I gradually overcame my troubles.

I have already made reference to the value of a bonus or profit-sharing system in inducing workmen to take a greater interest in their work. Situated as we are, we cannot provide in any department the skilled supervision which medium and large works have at command. In this we miss the ideas begotten of the experience of the "power behind the throne." The outdoor demands on the time of a manager will or should be in keeping with the industrial activity or progressiveness of the place; and if the works belong to a local authority, the details and clerical work are, as a rule, increased.

The subject of distribution is now an all-important one. Even the smallest works demand intelligent attention and knowledge in this department. In Scotland, at one time, it was quite the usual practice to carbonize nothing but the best cannel coal, with a resulting high illuminating power. Under present-day conditions of lighting, heating, and motive power, we are gradually coming into line with the practice of the larger towns. It is with most of us now more a question of pressure than of a high-grade gas. The change to the generally accepted lower grade gas will enable us to sell it at a price that will better bear comparison with industrial centres and those places favourably situated in relation to the coalfields. I have no doubt you are frequently asked the question, "How is it the price of gas here is so much higher than in another place?" The relationship of the output to the capital involved, interest, repayment of loans, rates, labour, distance from the source of coal supply, the situation of the works as regards deliveries—all these are points which the consumer cannot grasp; but the difference entailed between manufacturing a lower and a higher grade gas is a matter on which he can be more readily enlightened.

Regarding the question of increased pressure, many of you may be situated as I am, in not having a reserve of initial pressure to efficiently meet the demands at certain times and at some distant outlying points. I have made very extensive renewals in laying larger mains to meet the want of initial pressure. Weighting gasholders is cumbersome. But would a pressure-raising plant be economical in a small works? A prevalent hindrance to a satisfactory gas supply—and such exists in very many Scottish towns—is the gas-fittings in the older class of properties. These are notoriously inadequate for present-day uses of gas, a source of frequent complaints, and also a stumbling block to increased consumption. These things, too, have the effect of precluding in great measure favourable competition with our, as yet, greatest rival—paraffin oil.

Distribution has the perplexing millstone of unaccounted-for gas hanging to it. I intended to go into this subject, but I had not ready details of experiences put into concrete form for discussion. From a cursory review of reports, I would say that gas-works of 20 million cubic feet and under have not, in the last decade, notwithstanding the great expense incurred in searching for leakages in mains and services, reduced the loss to a desirable percentage. In this, as in many other things, comparison with the larger and medium-sized works is out of the question. In their case the gas manufactured is corrected for temperature and barometric pressure, and every means is taken to get a correct estimate of the difference existing between the gas made and that sold. These corrections do not prevail in smaller works, though in many ways temperature affects us in a greater degree, and will account for a considerable percentage of unaccounted-for gas. Apart from the question of temperature, I am firmly of opinion that services and meters are the most fruitful source of loss. The advent of road rollers (in my district I have had broken mains whenever the roller has been at work), absence of valves in districts to shut off the gas when working at mains or services, frequent changing of purifiers where these are small, and the supply to public lamps, are all contributing factors to the problem.

The introduction of suction gas plants all over the country has been the theme of many discussions at Association meetings. Generally, in making a comparison of costs, 2s. per 1000 cubic feet is taken for town gas. I am afraid that in all the smaller Scottish towns, where the price rules so very much higher than this, it would seem that, without further probing of the matter, town gas would be hopelessly out of it as a competitor. Two suction plants have been erected in a factory near Dunbar. One is stated to be 30 B.H.P. and the other 50 B.H.P. The former has been at work for over a year now; the latter was recently erected. Town gas is used to start the engine, during repairs, and during periodical lapses. For this plant, the bill for town gas for one year, at 3s. 4d. per 1000 cubic feet, was £27 17s. 6d. I find from a series of tests taken by myself that, working under full load with town gas, the maximum consumption is 360 cubic feet per hour, or 12 feet per stated brake-horse power. The working hours are 56 a week. So $360 \times 56 = 20{,}160$ feet, which, at 3s. 4d. per 1000, comes to £3 7s. $2\frac{3}{5}$d. With the suction plant, it takes 5 cwt. of anthracite per day of ten hours, equal to 28 cwt. per week, which, at 25s. per ton, comes to 35s. The attendant has 21s. 6d. per week, which brings the total up to 56s. 6d. per week. This shows an apparent saving of 10s. 6d. per week, without taking any cognizance of depreciation and maintenance and repairs, for which an outside engineer must be called in. Without the aid of town gas for a stand-by, the work of the mill would have been frequently hindered, entailing considerable loss of time and increased manufacturing costs. From my simple experience, the reliability of town gas is an important asset, against the unreliability of suction plant, in comparing costs.

Last year there was a large increase in the valuation for assessment purposes in the case of several works in the Waverley area. I do not propose to go into the methods by which valuation for assessment purposes and income-tax is arrived at. I cannot do better than advise members to have by them for study Newbigging's book on the subject; and the clear and concise paper by Mr. A. Yuill, of Dundee, entitled "Some Aspects of the Commercial Management of Works," read before the North British Association in 1905. I am justified in saying that secretaries and clerks to local authorities, in whose hands this matter is more generally left than with managers, do not give it sufficient attention. It behoves managers to be conversant with it. Last year, in going over a balance-sheet with the secretary of a gas company, who was a banker, I made the observation that they were over-assessed. We afterwards interviewed the assessor, with the result that a deduction of £100 was obtained, as also a deduction of the poor-law assessment and income-tax. Should there be any dubiety as to the valuation of an assessor, a personal interview is far more satisfactory than writing. By having a fairly clear conception of how an assessor arrives at his valuation, a manager may do much to regulate his expenditure, so that his assessments may run fairly equal one year with another.

We are most fortunate in having our meeting in the Scottish National Exhibition. Here in our midst we see the extraordinary development in the direction of the application of science to industry. Science is becoming more and more important; and no industry will maintain its place unless it has the highest science at its disposal. The Gas Engineering courses at the Leeds University offer the highest technical training combined with practice. There can be no question that a University course trains the mind into a system of analytical reasoning and thinking that no amount of spasmodic learning by the way can acquire. We should bear in mind that some engineers seem to be born with knowledge already in them. They learn by instinct what others gain only by long experience. The natural leader cannot be kept out; but the commercial instinct is required to bring into creative practice the work of the laboratory.

In conclusion, I should like to say that if all in the Waverley

area who are eligible came forward, it would immensely benefit the status and aims of this old Association. The leaders of the profession generally set a grand example, and, aided by our splendid Technical Press, have placed the gas industry among the foremost industries of the world and given it the prominence which is its due.

Discussion.

Mr. W. R. Herring (Edinburgh) proposed a vote of thanks to the President for his address, and remarked that, both in style and composition and breadth and depth of thought, it would scarcely have its equal among Presidential Addresses. He said this in all sincerity. The President had tackled so many branches in their particular industry that it seemed to him he had provided subject-matter for discussion at two or three meetings. But there was a good deal of the address which was worthy of mature consideration. The President suggested that the Association was principally composed of those who were engaged in small gas-works. Those of them who had the misfortune to be engaged in large works sometimes envied those connected with small ones. In a small works, the manager was able to keep in closer touch with daily operations than was the manager of a large works, because, in the case of the latter, he had to sacrifice so much time to other matters, and leave to others so much which he would like to follow out himself. In small works, they had the chance of initiating and following out new ideas which it was difficult for a man in a large works to do. There was one passage in the address which particularly took his fancy—that in which the President said they had all departed from the old axiom. No doubt they had all done so; and he did not think there was any industry in which they had shown themselves more able to depart from the old ways than the gas industry. And this not only from the point of view of the manufacturers, but from that of lighting. Not many years ago, 3 or 4 candles per cubic foot was considered high efficiency with Scotch gas; but they would that night see lamps giving 75 candles per cubic foot. This was an advance with a vengeance. The President referred to the advantages of buying good coal. By this he understood him to mean coal which, preferably, gave a high yield. He was very much struck with the remark with regard to giving a bonus. Further on, the President spoke of the difficulties of supervising operations. He thought it was a very happy idea—that of introducing some form of bonus system. There was no doubt that if they gave a workman some monetary interest in what he was doing, he would be a keener and a more active employee than he would otherwise be. On the subject of condensation and the lengthening of the foul main, the idea occurred to him that the foul main should have an inclination towards the hydraulic main, so that the light oils would flow back towards it. Pressure suggested a word or two about incandescent lighting. They knew that in the old days "no pressure" was considered the proper thing to work at, because it was believed to lead to a lower leakage account. However, when the higher pressure began to be used, it was found that the leakage did not increase as had been expected. Then the introduction of the upright incandescent burner necessitated a greater pressure in a district. He thought the upright incandescent burner was already out of date; its time was past. The present burner was the inverted. These burners required still more pressure than the upright ones; so that in the present day the necessity of being able to give their districts a good pressure was absolute. Where they had a house in which there was not a good pressure, they should not put in incandescent burners, because they would not be satisfactory. The President's figures with regard to suction gas were very interesting. They coincided very much with what he had experienced in Edinburgh. He did not think that suction gas was going to do their industry any harm. He was hopeful they would find a means of working gas coke in producers for the purpose; and he did think that if anything could be done to reduce the number of chimney-stalks in towns, they should encourage it, rather than feel that they were losing some of their customers in the coal-gas industry.

Mr. A. Bell, sen. (Dalkeith), seconded Mr. Herring's motion. In Scotland, even in his day, when they were making 28-candle gas, he said, things were different from what they were now. The advance had been immense. They then worked a high-candle gas, with a low pressure. It was different now. He used to be an advocate of high-grade gas; but now they scarcely ever saw a flat-flame burner. Therefore they were bound to "toe the line," and do what they had declared they never would do. They were now making, practically, English gas, and of necessity, because, though experts might be able to use 28-candle gas with incandescent burners, the ordinary consumer could not, and complaints were endless. They were obliged to serve their customers. Therefore they had all had to come down. Managers of small works were in a better position than those of statutory undertakings, because they did not require to publish to the world what they were going to do. The only thing necessary, for the sake of peace, was to do it slowly, so that consumers might forget what they used to be supplied with. He had more complaints now—of the gas being too rich—when making 18 to 20 candle gas, than when he was sending out 28-candle gas. They thought it was foul, because it blackened the mantles. The only remedy was to bring the gas down till it would not do this; and they then got congratulations. In Dalkeith, the works were started in 1828; and he knew that some of the original fittings were still in existence. With the same small pipes, houses were larger, and more burners were put upon them. He was sorry to say that the gas-fitters were not better educated nowadays than they used to be. They would put on extra burners, and then say there was want of pressure. It was not want of pressure; it was want of volume. But the whole blame came back upon the poor gas manager. They must get the consumers, the gas-fitters, and the architects educated to make provision for the gas supply. Their mains were old, and the making of large calls for outlay to renew them must be done slowly. But the day was fast coming in which they would not only be able to content their customers with good gas, but also to give them full supply.

Mr. J. Black (North Berwick) said he would like some little explanation with regard to the retort-house governor. He had for some time been wanting his Commissioners to go in for one; but they had not done so yet. He saw in the Perth works, a fortnight before, a retort which Mr. M'Lusky told him had been in use for five years; and he had seen retorts in no better condition after having been in use for only five weeks.

Mr. H. O'Connor (Edinburgh) remarked that the President referred to the arrangement of the settings in a small works. He knew of a small works where the smallest number of retorts they had in a bed was seven. It was quite evident that if they had to light up and let down seven at once, they were working the retorts harder at times than they should be; and at other times they must be stopping the making of gas at a much earlier hour of the day than they might. Consequently, a large quantity of coke must be wasted in keeping the retorts up. The question of increased pressure was coming forward every day, and would certainly do so in Scotland more than in England, because of the smallness of the pipes in the houses in Scotland. This was certainly a subject which was to be taken into consideration, not only on account of the pipes, but also on account of the reduction in the quality of the gas, because, if the quality were reduced, they would require a larger quantity to get the same amount of light. Then, low-quality gas might help to reduce the leakage in Scotland, which, they would notice, was always much higher than in England. He thought this had to do with the richer quality of gas which had generally been supplied in Scotland, because of the considerable amount of condensation in the pipes. He did not believe that the temperature had so much to do with it; nor did he think that so much of it as was generally supposed was loss through leakage in the pipes. Much was due to condensation of the hydrocarbons, which were not delivered to the consumer.

Mr. W. B. M'Lusky (Perth) desired to associate himself with the other gentlemen who had spoken in thanking the President for his address. He had always known the President as a carbonizer of the very first rank; and he had always heard that he succeeded in pleasing even Mr. Herring, which was saying a great deal, because Mr. Herring sold more gas per ton than any other manager in the country. This was a very difficult thing to do, because in Scotland they had so many varieties of coal at their command that it was hard to make a selection. It was not the same in England. In Perth, he found that nuts of ½ inch cube gave very much better results than any other coal; but, of course, it all depended upon where the nuts came from. Retorts of 12 inches diameter would, in his opinion, be more suitable for the Border District than the larger ones. This would be coming back to the idea of the late Mr. W. Robson, of Selkirk. Another advantage to the managers of small works would be to adopt the Continental idea of retorts 2½ inches thick. There was no reason why managers of small works should copy unreasonably what was done in larger works. Why should all retorts be 3 inches thick? Leakage had been spoken of. He did not believe in leakage at all—in fact, he had come to think that, in the ordinary way of business, there was no such thing as leakage, and that they might almost eliminate it from their accounts. Take the quantity of gas sold in Edinburgh, and the changes in climate, temperature, and pressure. In Selkirk, he had a loss of 5 per cent. in shrinkage alone—the difference in temperature between the gas at the station meter and the temperature at which consumers used the gas. But he did not lose 5 per cent. of gas between the station meter and consumers' meters. At Perth, it was supposed to be about 2½ per cent.; but he did not believe that it was. They turned over about one-third of their prepayment meters every year; and they found more than 2½ per cent., either way, with these meters.

Mr. W. Blair (Helensburgh) thought there was no doubt that the practice in gas manufacture and distribution had altered during the last 25 years to an enormous extent. He had the opportunity of designing a new retort-bench when he was in Haddington. He had been working with a semi-regenerative principle, and he put up four ovens of threes, which suited their purpose admirably. The make of gas was 7 millions per annum. He believed it was now up to 15 millions; and the same ovens were still doing useful work. But the ovens had been converted into fours, and, he believed, fives. So that, on the same capital charges, they were able to produce double the quantity of gas. He believed in high heats. He had worked in Haddington with a chauffer below the bridge-pipe, to liquify the pitch in the dip-pipe. They had to face a higher pressure, on account of the introduction of gas-engines, gas-cooking apparatus, and incandescent lighting. They had to face it both day and night. When he took up duty at Helensburgh, the unaccounted-for gas amounted to 19 per cent. They had about 15 miles of mains, from which they sold scarcely a million per annum. Since then, however, he supposed through attention to leakages, meters, and other things, they had been able to bring the unaccounted-for gas down to

8 per cent.; and notwithstanding this, the pressure had increased by one-eighth. They had a sea-front main of over seven miles in length, and the largest consumer at the fifth mile, using perhaps 2500 cubic feet per hour. To increase the pressure in this district, he had to apply 4-inch pressure at the works. Unless he could do this, there were continual complaints. He had only 100,000 cubic feet of storage; but they were about to do away with a small holder, and put up another, which would give 250,000 cubic feet, from which he expected to be able to furnish the supply at 4 inches, without having to increase the main. Leakage and high pressure did not always go together. He had extended the mains by about 5 miles, with no increase of leakage. If the plant were in an efficient state, no one need be afraid of adding another inch or half-an-inch to the pressure.

Mr. J. D. SMITH (Stirling) said his experience of retort-house governors was very short—only about nine months. After putting up the governor, he had been able to reduce the seal to ¼ inch. There was 2-10ths pull on the hydraulic main; the yield of gas had gone up 400 cubic feet per ton; the illuminating power was more constant; and of stoppages he had practically none.

Mr. J. HEPWORTH (Edinburgh) said the point in the address which he would refer to was that of assessments. He admired the way in which the President suggested that extraordinary and excessive assessments might very easily, in some cases, be obviated. He commended the manner in which he had acted in this matter; and he was perfectly sure that, though they might occasionally have unreasonable men to deal with, yet, in nine cases out of ten, if they could enlighten them, they would get their assent and consent to a modified and really business-like conclusion. The same thing might be said of the question of fittings. When he had charge of a gas-works, he had a rule laid down, which was supposed to be for the guidance of architects and builders, in regard to the size of pipes to be put into houses. He did not know that he had really full power to insist on the rule being attended to; but if he had to do with a reasonably-minded architect or builder, he could almost invariably be sure of his adoption of the recommendation he made. If they were to lay themselves out a little more than they sometimes did to instruct and persuade the persons who had to do with these things, they should get a good deal of their own way, to the advantage of everybody, and, not least, to the benefit of the people who were putting up the properties.

The PRESIDENT said that Mr. Herring's remark about the incline of the foul main had struck him very forcibly. He had taken it in a position contrary to that; but after what he had heard, he might take it the other way. He thanked the speakers for what they had said.

Mr. W. YOUNG (Penicuik) presented the President's Medal of the Association to Mr. O'Neil, who briefly returned thanks for the souvenir.

ELECTION OF OFFICE BEARERS.

The following were elected office-bearers for the year:—

President.—Mr. W. Brown, of Lasswade.

Hon. Secretary.—Mr. W. Young, of Penicuik.

Members of Committee.—Messrs. J. Tulloch, of Loanhead; A. Bell, sen., of Dalkeith; P. Blair, of Haddington; H. Rutherford, of Aberlady; J. Gemmell, of Melrose; and J. M'Laren, of Duns.

The members and friends, to the number of about seventy, at the close of the meeting, dined together in the Prince's Restaurant—Mr. Brown in the chair. The toast of "The Waverley Association" was proposed by Mr. R. Henderson, the Chairman of the Penicuik Gas Company, Limited.

The remainder of the afternoon and evening was spent in the Exhibition; most of the company staying to see the grounds lighted up. The lighting arrangements and results, it is almost needless to say, were universally admired.

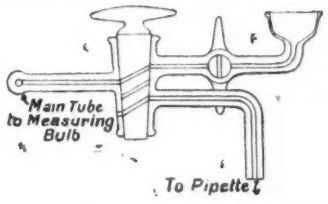
Members wish to know the intentions of the Government with regard to their Coal Mines Bill. Last Wednesday, Mr. T. Glover, the Labour Member for St. Helens, asked the Prime Minister whether he could state the day when he would bring on the Bill for second reading; and whether it was the intention of the Government to pass it into law this session. In reply, Mr. Asquith said he hoped the second reading might be taken on the 17th inst., but he could not at the moment give a definite pledge. Every effort would be made to pass the Bill into law during the present session.

Water filtration by lateral flow is provided in a gravity plant designed by J. Grant M'Gregor, of Goderich (Ont.). The filtering material consists of stone and sand of three different sizes in separate beds, placed in concentric rings—the coarsest material being in the largest. The raw water is distributed by segmental nozzles over the first bed, the drain from which is inward, discharging into the next smaller filtering-ring, placed at a lower level. The third ring, containing the finest sand, is at a still lower level, and discharges into the clear water reservoir, occupying the centre of the circular plant. This arrangement allows the water to pass by gravity from the base of a higher to the surface of a lower bed. The circular beds are divided by radial walls into units of suitable size for cleaning; provision being made for wash-water outlets. "Engineering Record" states that the design, which has been patented, is known as the Alpine gravity filtration plant.

ROSS & LEATHER'S GAS ANALYSIS APPARATUS

At the Meeting of the Manchester Section of the Society of Chemical Industry on the 3rd of April, Mr. Raymond Ross, F.I.C., and Mr. J. Petty Leather submitted a communication in which they described an apparatus designed by them for making accurate analyses of gas. It is shown in the accompanying illustration, which, with the descriptive particulars and the report of the remarks made upon the apparatus, are reproduced from the current number of the "Journal" of the Society.

The apparatus consists of a measuring bulb surrounded by a water-jacket. This is provided with a three-way stopcock, and connected by flexible tubing to a mercury reservoir and also to an 800 mm. graduated tube. The bulb communicates with eight absorption pipettes by means of a capillary tube provided with specially designed stopcocks. The construction of these will be understood by reference to the illustration.



The method of working is as follows: By raising the mercury reservoir, the measuring bulb and the whole of the connections are filled with mercury, which is allowed to flow through each stopcock in turn till the small glass cups are about half filled. The reservoir is then lowered till the mercury falls to the mark on the bulb. The barometric pressure is now read off in millimetres, including the tension of aqueous vapour—sufficient water for the purpose being introduced with the mercury. The barometer tube is then shut off, and the bulb refilled with mercury, and the gas to be analyzed introduced into the bulb and brought exactly to the mark at atmospheric pressure. To introduce the gas into the required absorption pipette, the mercury reservoir is raised, and the mercury in the capillary connection tubes driven forward by the gas into the cups till the gas just reaches the three-bored stopcock. The small stopcock is then closed. The absorbent is driven up by means of the short rubber tube till it fills the bore of the tap. The stopcock is then reversed, allowing the gas to enter the pipette. When the absorption is complete, the process is reversed, and the gas finally swept through the capillary tube into the measuring bulb by means of the mercury from the cup. The mercury is again brought to the mark in the bulb—connection with the millimetre tube having been re-established. The reading multiplied by 100 and divided by the first ("barometric") reading gives the percentage absorption. The pipettes are all filled with glass beads, and hold about 250 c.c. of absorbent. The usual absorbents are employed; and the ammoniacal cuprous chloride solution is protected from oxidation by bulbs containing water. Explosions are carried out in the bulb, the portion of the gas not required being passed into one of the absorption pipettes. The whole apparatus is about 50 inches high, and for convenience of working is mounted on a stage about 15 inches high. In the authors' hands, the apparatus has been found easy of manipulation and giving very accurate results.

In the course of the remarks made upon the apparatus, Dr. G. H. Bailey said he considered it better than any other of the Orsat or Hempel type. He asked what length of time was occupied in completely expelling air from the bulbs and capillary tubes as described, and said he hoped the authors would say how they had fared with vaseline and mercury in the absorption tubes containing caustic potash. Dr. G. J. Fowler asked if, with a maximum volume of 150 c.c., the apparatus would not come under the same criticism as a similar apparatus he had described some time ago for analyzing gases from sewage, which was arranged to permit of explosions being made over mercury in the measuring pipette, but which was not capable of the same degree of fineness as the authors' apparatus with regard to adjusting the mercury. He asked whether any difficulty had been found in obtaining complete explosions with small percentages of methane; or, on the other hand, whether, with gas containing a large percentage of combustible constituents, the volume could be reduced considerably. In reply to Dr. Fowler, Mr. Ross said whatever amount was taken, it was brought to constant volume. If desired to explode it, air or oxygen could be used, constant volume re-established, and the amount taken read off. The experimental error was slightly over 0·1 per cent. The use of fresh solutions, as recommended by Professor Bone, was a decided disadvantage. All gases were somewhat soluble in any solution, and accurate results could only be obtained after several analyses had been made with the same solvents. In reply to Dr. Bailey, a complete analysis could be carried out in about an hour. The taps were greased with an emulsion of vaseline and mercury, which acted very well.

Mr. W. M. Burke was on Thursday last appointed City Chamberlain and Gas Treasurer by the Dundee Town Council.

STREET LIGHTING IN THE CITY OF LONDON.

Report by the Electrical Engineer to the Corporation.

Reference has been made at various times in the "JOURNAL" to the experiments which are being carried on in portions of the City of London to test the relative merits of gas and electricity for public lighting. A long report on the subject has been made to the Streets Committee of the Corporation by the Electrical Engineer (Mr. A. A. Voysey); and it is printed *in extenso* in the current number of "Electrician." We reproduce it from our contemporary, to the publisher of which we are indebted for the use of the blocks of the diagrams by which it is accompanied.

It is now my duty to report on the subject of the public lighting of the City, having regard to recent experiments which have been made with a view to improve and cheapen it. In the first place, I propose briefly to refer to what is called the science of photometry, of which I have made some use for the purpose of this investigation.

Many people, even to-day, in dealing with questions of artificial light, are content with a statement of the candle power of the source of light—a statement frequently as false as it is vague, taking no account of the directions in which light is given, of the globe, lantern, reflector, position, and surroundings of the lamp, all factors of the utmost importance in determining the useful lighting effect. However important the study of the source of light may be, the study of the actual illumination in the street under working conditions is far more essential. In 1892, the work of Mr. A. P. Trotter, now the Electrical Adviser to the Board of Trade, showed the lines on which such an examination might proceed, and at the same time provided an excellent illumination photometer for the purpose. I worked a great deal with this instrument in the City in 1896; taking measurements of the illumination on a horizontal surface 6 inches from the ground, and formed the opinion that the illumination measured on a horizontal surface may be taken as a sufficient indication of the effective lighting of a street. I am now again led to the same conclusion. But as the tendency is to measure illumination at a height of 4 feet from the ground, my recent tests have been made at this level. The photometer used is an improvement on the one used in 1896, and was sent to the National Physical Laboratory for verification. The unit of illumination is that produced by 1-candle power at a distance of 1 foot, and is called 1 candle-foot.

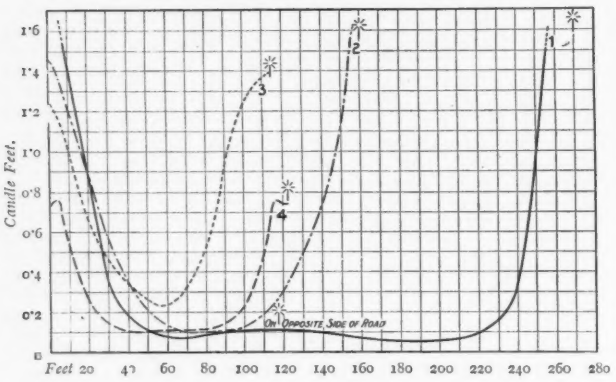


FIG. A.—*Curves showing Illumination along the Curb Line in Holborn Viaduct, Cannon Street, and Queen Street.*

Curve No.	Street.	Lamps.	Current. Amps.	Height and Support.	Illumination. Max.	Aver.	Min.	Width of Street. Feet.	Relative Cost.
1	Holburn Viaduct	Flame arc	10·6	20·5 ft. Post	2·00	0·41	0 05	77·5	118
2	Cannon St.	,,	11·0	28·0 ft. Central	1·60	0·56	0·1	50·0	100
3	,, ,,	,,	11·0	Do.	1·40	0·12	0·23	50·0	139
4	Queen St.	High-pres. gas (two mantle)	..	13·0 ft. Post	0·76	0·29	0·1	50·0	196

Attached hereto will be found some curves showing the illumination given in Holborn, Cannon Street, and Queen Street by the experimental lamps. The length of the street in feet is plotted along a horizontal scale, and the vertical scale is marked in candle-feet and fractions thereof; so that the curves show the variation in illumination along the street. Curves "A" show the illumination along the curb line given by flame arc lamps in Holborn Viaduct and Cannon Street and by gas in Queen Street. Curves "B" are similar, but are taken along the centre of the road. Curves "C" show the difference in illumination along the curb in Cannon Street, between the central suspension of lamps at a height of 28 feet and lamps on posts at a height of 20 ft. 6 in. Curves "D" are similar, but along the centre of the road. There is also shown the effect of turning out one of the centrally hung arc lamps. Curves "E" show the effect of suspending the lamps in Cannon Street at 26 feet instead of 28 feet. Curves "F" show the effect of lighting Tower Royal with the centrally-suspended flame arc lamp in Cannon Street, with a flame arc on a post and with two incandescent gas-lamps. The arc light curves marked "A" and "B" are each taken as the mean of several curves, and the atmospheric conditions when the tests were

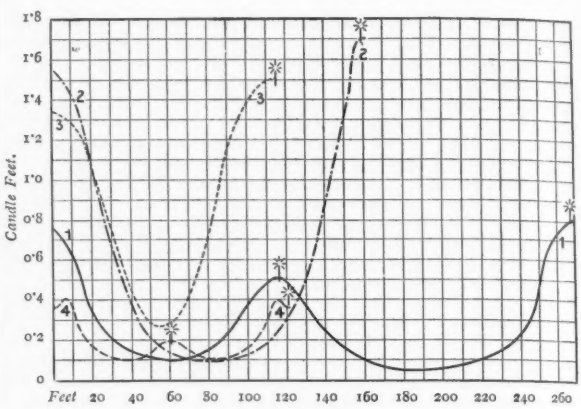


FIG. B.—*Curves showing Illumination along the Centre of the Road in Holborn Viaduct, Cannon Street, and Queen Street.*

Curve No.	Street.	Lamps.	Current. Amps.	Height and Support.	Illumination. Max.	Aver.	Min.	Width of Street. Feet.	Relative Cost.
1	Holborn Viaduct	Flame arc	10·6	25·5 ft. Post	0·8	0·28	0·06	77·5	118
2	Cannon St.	,,	11·0	28·0 ft. Central	1·7	0·66	0·10	50·0	100
3	,, ,,	,,	11·0	Do.	1·5	0·88	0·28	50·0	139
4	Queen St.	High-pres. gas (two mantle)	..	15·0 ft. Post	0·4	0·21	0·10	50·0	196

made were clear and favourable. The curves "C," "D," "E," and "F" were taken with a view to make specific comparisons; and they each represent a single set of observations. The atmospheric conditions prevailing when curves "E" were taken were distinctly inclined to be foggy.

It is now necessary to consider what conclusions can be drawn from the curves. I have already stated that I think the illumination given on a horizontal surface can be taken as a sufficient indication of the value of the lighting in a street. Next, I have formed the opinion, from observation and testing, that the minimum illumination is the most important factor in good lighting; and I have come to the conclusion that about one-tenth of a candle-foot is the minimum below which it is not desirable to go in the main streets of the City. If this figure is adopted and maintained, then I think the main streets of the City will be very well lighted. If the curves for Holborn Viaduct are studied, it will be seen that, although the Viaduct is a very wide thoroughfare, the lighting is not very far from complying with the minimum value which I think necessary.

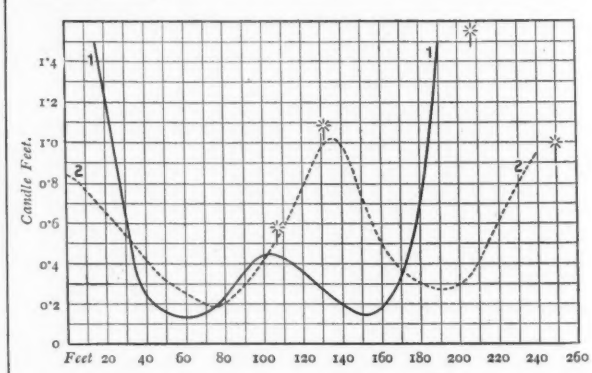


FIG. C.—*Curves showing Illumination along the Curb in Cannon Street.*

Curve No.	Street.	Lamps.	Current. Amps.	Height and Support.	Illumination. Max.	Aver.	Min.	Width of Street. Feet.	Relative Cost.
1	Cannon St.	Flame arc	11	20·5 ft. Post	2·00	0·68	0·14	50	155
2	,,	,,	11	28·0 ft. Central	1·02	0 56	0·19	50	127

In order to meet any possible objection to unpleasant colour, the Holborn Viaduct lamps are trimmed with carbons giving a pleasantly-toned light; but the illumination is thereby reduced. If 7 mm. and 6·35 mm. (cores $\frac{3}{32}$ inch and $\frac{1}{16}$ inch respectively) carbons are used on Holborn Viaduct, giving a yellower light, the minimum illumination would be increased so as not to fall far short of the necessary value, and it could be regarded as approximately fulfilling what I think are the reasonable requirements for the sufficient lighting of a City main street. I do not think that the Holborn Viaduct can properly be compared with Cannon Street, because, in addition to other

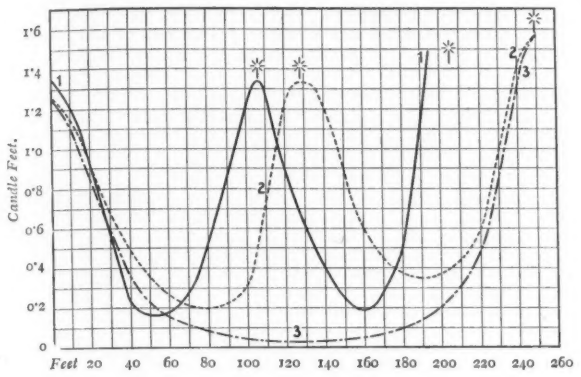


FIG. D.—*Curves showing Illumination along the Centre of the Road in Cannon Street.*

Curve No.	Street.	Lamps.	Current Amps.	Height and Support.	Illumination. Max.	Aver.	Min.	Width of Street. Feet.	Relative Cost.
1	Cannon St.	Flame arc	11	20·5 ft. Post	2·00	0·70	0·17	50	155
2	,,	,,	11	28·0 ft. Central	1·56	0·72	0·20	50	127
3	,,	,,	11	28·0 ft. Central	1·56	0·40	0·04	50	64

reasons, the width of the Viaduct is about 50 per cent. greater than the width of Cannon Street. Therefore, I determined to make another test in Cannon Street, first with the centrally-hung lamps as used at present, and then with identical lamps on posts on the footway; keeping the conditions of current and carbons the same for both. The arrangements for this test were kindly made for me by the City of London Electric Lighting Company; and the results shown in curves "C" and "D" indicate the advantage obtained by central hanging in a street such as Cannon Street, which is fairly typical.

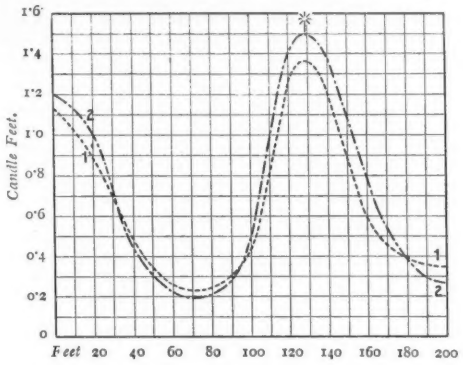


FIG. E.—*Curves showing Illumination along the Centre of the Road in Cannon Street.*

Curve No.	Street.	Lamps.	Current. Amps.	Height and Support.	Illumination. Max.	Aver.	Min.	Width of Street. Feet.	Relative Cost.
1	Cannon St.	Flame arc	11	28 ft. Central	1·37	0·66	0·23	50	..
2	,,	,,	11	26 ft. Central	1·50	0·72	0·23	50	..

The illumination curves of the centrally-hung lamps in Cannon Street show that the lighting also fulfils the suggested condition that the minimum should not be less than one-tenth of a candle-foot. I think the curves are very good ones, and indicate what is obvious from an examination of the street—namely, that the lighting is very good. And if we study the curves, the advantages of the central suspension and the extra height of the lamps are evident. From the central suspension there is, however, an additional gain for side streets and at the junctions of streets, owing to the fact that the light of one lamp can be used over a greater area. For instance, 45 per cent. of the cost of lighting in Cannon Street is saved on gas in the side streets. This economy could to some extent be obtained by placing posts at the corners of streets; but I do not think it could be obtained to the same extent as is possible with the higher centrally-hung lamp. An experiment was made in Cannon Street at the suggestion of the late Chairman, Mr. Stopher; some of the lamps being hung at 26 feet instead of 28 feet. The result is given in curves "E," which, I think, show that the higher position is slightly better than the lower one. Curves "F" show the illumination in Tower Royal (a turning off Cannon Street), lighted by the centrally-hung arc lamp, and by the arc lamp on a standard in Cannon Street, and by the two incandescent gas-lamps

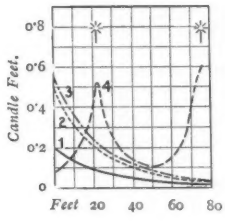


FIG. F.—*Curves showing Side Street Illumination (Tower Royal).*

Curve No.	Lamps.	Current Amps.	Height and Support.	Illumination. Max.	Aver.	Min.	Relative Cost.
1	Flame arc	11	20·5 ft. on post	0·20	0·08	0·025	Nil
2	,,	11	28·0 ft. central	0·48	0·16	0·040	,,
3	,,	11	26·0 ft. central	0·56	0·19	0·040	,,
4	Low-pres. gas (single mantle)	..	11·6 ft. bracket	0·60	0·25	0·080	£6 14 4 per annum

on brackets in Tower Royal. The curves show the advantage of the central suspension.

Attention should be drawn to curve "D," No. 3, which shows the effect of extinguishing alternate lamps in Cannon Street. The curve does not fulfil the requirements of a well-lighted main street, but it shows a better result than Queen Victoria Street, and the lighting is very fair. If it were not for the fact that the cleansing of the streets is an operation which may be greatly assisted by good lighting, I should be inclined to recommend the turning out of half the lights in main streets at midnight; and I think the matter is worth consideration. This is, perhaps, an opportune place to discuss the question of lighting hours. In my opinion, the fixing of lighting hours between sunset and sunrise is a mistake; and I think the lighting might be curtailed on an average by about one hour per day—half in the morning and half in the evening—if a reasonable reduction were made in the annual charges. It is now desirable to consider the question of comparative cost; and this is bound up with the question of spacing.

The average distance between the centrally-hung lamps in Cannon Street is approximately the same as that of the standards in Holborn, though Holborn is 50 per cent. wider than Cannon Street. The average spacing of the centrally-hung lamps in Cannon Street is a little closer than the spacing of the old standards in that street; there being 11 of the suspended to 10 of the lamps on standards. The extra lamp results really from the consideration of the side streets rather than from any need in Cannon Street itself. With regard to spacing, a regular distance should be followed as closely as possible; but due consideration must be paid to side streets and cross streets, in order to obtain the most economical results. As will be seen from the curves, the distance between the lamps in Cannon Street varies from 112 feet to 165 feet. I think the latter distance may be regarded as the extreme, beyond which it is not desirable to go; whereas the former is closer than is necessary, and can only be justified by a consideration of the side streets.

For the purpose of comparing the effect of gas with electric lighting, I made a test in Queen Victoria Street; but I found a large portion of this street with a very low illumination, and neither from observation nor test did it appear to me at all comparable with Cannon Street. I therefore sought out a piece of good gas lighting; and I found this in a portion of Queen Street. It was interesting to find that the piece of street I picked fulfilled the condition which I had fixed as essential for a well-lighted street—namely, that the illumination on a horizontal surface 4 feet from the ground should in no place be less than one-tenth of a candle-foot. The average illumination of the picked piece of gas lighting in Queen Street—which is, fortunately, just the same width as Cannon Street—is only about half that in Cannon Street, though it is about double the cost. This confirms what I reported three years ago as the result of some photometric tests—namely, that, light for light, high-pressure incandescent gas-light costs four times as much as the flame arc light. It may here be observed that departments of the Corporation other than the Public Health Department are now saving at the rate of about £3000 a year, partly by changing from gas to electricity, and partly by bringing electric lighting up to date; and I have good reason for saying that this sum could be considerably added to.

On the whole, I think it may be fairly assumed that about 500 11-ampere flame arc lamps will light the main streets well, whether hung centrally or on standards. The cost of these, at £17 10s. each, would be £8750. The present cost of lighting the whole City is about £22,000 a year, about half the cost being for electric light and the other half for gas. In addition to this, a sum of about £17,000 appears to have been spent in the last nine years on providing and maintaining apparatus for gas lighting. The side streets can be very much better lighted by centrally-hung arc lamps than they are at present for a sum which I estimate approximately at £5000 to £6000 per annum. It is very important, in my opinion, that the main street lighting should not be arranged independently of the side streets. Economical effective lighting of both is bound up one with the other. A few lamps arranged in the side streets off Cannon Street would quickly show what can be done. I have very little doubt that the average illumination throughout the whole of the City streets can be at least doubled, and a saving of about £6000 a year effected.

On the subject of lamp-supports, I think it may be remarked, with regard to the central suspension, that the plan followed in Cannon Street, of making them as invisible as possible, is a good one. Attachments would have to be securely made, and the supporting wires be

carefully examined; and no doubt the existence of a large number of such supports in the City would necessitate some extra cost to the Corporation in the supervision of overhead wires. But if reasonable care is used in the matter, there should be no danger whatever attaching to the central suspension of lamps.

In the main streets, the plan of trimming the lamps in position during the early hours of the morning is a sound one. No doubt some small occupation of the roadway space during busy hours would take place when a lamp went wrong at such a time; but it must be remembered that a standard on the footway remains for several thousands of hours each year as an obstruction to traffic, and must necessarily be a much greater cause of inconvenience than the very occasional visit for a few moments necessitated by a fault in a centrally-hung lamp.

In narrow streets it would be advisable to arrange for bringing the lamps down to the footways for trimming, because otherwise serious obstruction to traffic would occur. In some very wide streets, like Holborn and Farringdon Street, it might be advisable to use standards placed in the centre of the road; and, in any case, a certain number of standards may be required.

While I recognize the importance of economy, and the consequent need to use existing material as much as possible, I think I ought to point out the unsatisfactory condition of London in the matter of lamp standards, and especially electric-lamp standards. The design is usually left to an ironfounder's draughtsman. Mr. Norman Shaw has very kindly given his gratuitous aid in matters affecting the appearance of London, and I think his help might very well be asked. If new posts are found to be necessary, I think some endeavour should be made to redeem the reputation of London in this matter.

I will re-state my main conclusions: (1) That the illumination on a horizontal surface 4 feet from the ground is a sufficient indication of the useful light in a street. (2) That the minimum value of such illumination is the most important factor in good lighting. (3) That such minimum should not be less than one-tenth of a candle-foot. (4) That this illumination can be approximately obtained by 11-ampere flame arc lamps with yellow flame carbons, spaced approximately as at present, either on standards at 20 ft. 6 in., as on Holborn Viaduct, or centrally hung, as in Cannon Street, at 28 feet from the ground. (5) That a more even distribution of light and a more economical result can be secured by the centrally-suspended lamp at 28 feet than by the lamp at 20 ft. 6 in. on a standard. (6) That economy and efficiency require the treatment of main streets and side streets together. (7) That a demonstration should be made in the side streets of centrally-hung arc lamps as soon as possible. (8) That about £6000 a year may be saved and a doubling of the average illumination throughout the City streets effected by flame arc lighting, assisted by a few metallic filament lamps where arc lamps have not a sufficient area for economical lighting. (9) That, where central suspension is used, it should be without lowering gear in broad streets and with lowering gear in narrow streets. (10) That any new standards which may be required should be designed according to the advice of some reliable guide, such as Mr. Norman Shaw. (11) That the lighting hours can be reconsidered with a view to economy without prejudice to lighting efficiency. (12) That the question of reducing the lighting in the main streets at midnight should be considered.

In order to obtain as soon as possible the great advantages in economy and better lighting that I have shown to be possible, I think a small demonstration should be invited from both companies in the side streets; and some of the streets adjoining Cannon Street would be very suitable for the purpose. I also think it would be a great advantage if a provisional decision were come to as to whether the lighting is to be divided between the two Companies, and, if so, in what proportions. If that is done, and the side-street demonstration of lighting found satisfactory, then the way will be clear for the preparation of complete plans and specifications for lighting the whole of the City; and instructions might be given accordingly.

Mannesmann Tubes at the Franco-British Exhibition.

The British Mannesmann Tube Company, Limited, have at the Franco-British Exhibition two stands—one in the Machinery Hall (No. 580), and the other behind the hall—to which the attention of readers may be directed. In the latter situation are shown the Company's weldless steel spigot and faucet tubes, in lengths up to 45 feet, which are used in place of cast iron for gas, water, air, and other mains. These tubes are coated with a special composition, and covered with jute cloth; and it is claimed for them that they are unbreakable and incorrodible, that the cost of laying and maintenance is very considerably reduced, on account of the long lengths, light weight, and other advantages, and that they are the means of effecting a large decrease in leakage. In addition to the ordinary type, some samples are shown of tubes with thickened sides, to enable superior service connections to be made, and with the "Parkinson Joint," used to a considerable extent in colliery districts. Specimens of bends, tees, and other fittings are also shown. Inside the hall the exhibits of principal interest to gas engineers comprise weldless steel lamp-posts, screwed and socketed gas, water, and steam tubes, and various flanged tubes. Other articles displayed include traction poles (about 32 feet high), telescopic poles, superheater tubes (some of them 45 feet long) bent into various shapes according to the boilers for which they are intended, high-pressure cylinders for carbonic acid, hydrogen, oxygen, &c., and various joints for pressures up to 6000 lbs. per square inch. These are composed of hot-rolled, hot-drawn, and cold-drawn tubing, of uniform, stepped, or tapered section. Expansion bends, U bends, coils, &c., are shown; an interesting exhibit being a steam bend in one continuous length of 45 ft. 6 in. made of 10-inch tubing. The manufactures of the Company are of special interest to gas engineers who are desirous of effecting improvements in their distributing plant.

REGISTER OF PATENTS.

Treating Bituminous Coal to Render it Smokeless when Burning, and to Recover Bye-Products.

DIXON, W., of Kelvinside, Glasgow.

No. 10,804; May 9, 1907.

This invention has for its object "a process for removing from bituminous coal all, or a large proportion of, those constituents which render its burning in open fires smoky, and for the recovery of bye-products from such constituents;" and before describing his proposal the patentee mentions that he is aware of Naef's patents Nos. 2917 and 18,279 of 1900.

According to the present invention (the patentee's own words), the bituminous coal to be treated is placed in a closed vessel* of such dimensions and shape—*i.e.*, it may be long and deep but must not be broad—that the heat applied externally shall permeate the whole of the mass so that it is raised to, and maintained at, a practically equal temperature throughout. Throughout the treatment, in which the contents of the vessel are maintained by the application of external heat at such a temperature that the volatile smoke-emitting matters in the coal are largely extracted, and for the purpose of rendering the resulting product porous, as distinct from ordinary dense and hard foundry and furnace cokes or from ordinary brittle gas coke, watery vapour or steam is distributed, as far as possible, equally and continuously throughout the whole mass at such temperatures as shall always have the effect of damping or reducing the temperature due to the external heat. The steam may be under pressure or practically not; it may be saturated or it may not; and it may either be forced or drawn through the vessel. It is said to have been found that when watery vapour or steam is thus used in increased quantities as desired, so as to prevent the decomposition of the nitrogenous compounds, a largely increased yield of bye-products is obtained; while the external temperature may be considerably higher by reason of the internal damping effect without destructive distillation of the fuel ensuing, than if the fuel were merely subjected to external and internal heating. Moreover, the fact that a higher external temperature may be thus safely used greatly expedites the process. The temperature at which the bituminous coal is maintained throughout its treatment, and the duration of the treatment, depends largely on the nature of the coal. Hard coal, having comparatively little bituminous matter but much combined water, cannot stand such a temperature as the softer and more bituminous; and, conversely, its time of treatment is longer. For example, experiment has shown that certain "Scotch" coal (which is hard) requires a treatment of from 4 to 4½ hours at an external temperature between 650° and 700° C. to bring it to the desired condition; certain "Lanarkshire" semi-coking coal about 4 hours at a slightly higher external temperature of 700° to 750° C.; while certain English coking coal (soft and bituminous in character) requires about 3 to 3½ hours at a still higher temperature. That is to say, the harder and more splintering the coal, the lower the temperature it will stand, and the longer its time of treatment, conversely, must be to bring it to the desired condition—that condition being very considerably short of the "coke" state. In fact, the length of time of treatment and the external temperature at which it is conducted are such that (with the protective and damping effect of the steam used throughout the operation) destructive distillation does not (as it largely does in coke manufacture) ensue, but that such constituents of the coal as normally render it smoke-emitting are changed in character or removed. When evolution of the volatile constituents has taken place to the desired extent, the fuel ready for use is withdrawn from the vessel, which is then ready for a further charge—the process not being a continuous one.

When non-coking coal is used (which coal need not be ground small or crushed), a sufficient quantity of tar or other hydrocarbons may be charged on the top of the coal in the retorts, either in a solid or liquid state, before the coking is commenced, by which treatment the contents of the vessel are "agglomerated into lumps or compact masses, and attain coking properties."

The various volatile constituents evolved during the treatment of the fuel—largely gas suitable for heating, lighting, or power purposes—may be treated in known manner, and bye-products, such as ammonia, oils, and other matters, be recovered.

It is found that the addition of certain salts of the alkalis—such, for example, as sodium or potassium chloride, nitrate, or hydrate—to the coal enhances the yield of bye-products during treatment. Further, the addition of sodium salts gives to the fuel greatly enhanced flaming qualities.

Treatment of Tars and Pitches.

MALDEN, W. J., of Surbiton, and MALDEN, A., of Twickenham.

No. 12,230; May 27 1907.

This invention relates to the treatment of tars and pitches in order to render them more suitable for industrial purposes.

The known readiness of tar and pitch to soften under even slight rises of temperature is, say the patentees, found in various manufactures (such, for example, as in the briquetting of coal for fuel) to present serious disadvantages. With a view to overcoming this objection, various attempts have been made to treat the tar and pitch so as to enable it to stand varying temperatures without yielding—by driving off the more volatile oils in the tar, by evaporation, or by the addition to the tar of sulphuric or other acid. Again, in the preparation of compositions for making or covering roads, it has been proposed to employ alumina in the form of dried or powdered clay and mineral tar in equal proportions, which have been raised to a temperature of from 300° to 400° Fahr. and 2 per cent. of sulphuric or nitric acid added, or a similar quantity of acid has been added, together with 1 per cent. of black oxide of manganese, to the tar and alumina in the proportion and at the temperature above stated, which it was suggested would

* No drawings accompany this specification.

assist or expedite the carbonization and deodorization of the residue of volatile oils ordinarily remaining after the heating. But in all these cases the resultant product was not only very brittle at ordinary temperatures, but its ductility and tenacity were reduced so that it was unsuitable for many purposes.

The patentees claim to have discovered that the addition of manganese and sulphuric acid, in the manner hereafter stated, not only improves the tar so far as relates to the essential characteristics necessary to form a good binder, but, by varying the proportions of the acid and manganese one to the other, the degree or intensity of the characteristics may be increased or lessened. Moreover, they find that the manganese materially adds to the coking properties of coke and other materials which themselves possess little coking powers.

The manganese employed may be either the peroxide of manganese or the manganese of commerce; it being understood that in the latter case a greater quantity of the so-called manganese would be required than where the peroxide itself is used. The sulphuric acid to be employed should be preferably pure, of 1·84 specific gravity. The strength of the acid will, of course, affect the nature of the resultant product; the weaker the acid, the more in proportion will be required.

In view of the varying nature of the tar, or tar and pitch, or oil treated or other treated pitches, it is not possible, they say, to formulate a hard-and-fast-rule generally applicable to any tars or pitches irrespective of the source of origin or the physical condition at the time of treatment. It is due to this fact that in the employment of tars or pitches under the present known systems of briquetting fuel, and to the variation in the coking and other properties of different kinds of coal, that the variations in the results are dependent upon the mechanical treatment of the whole of the material and not upon the composition or character of the binder. They find, however, that for general purposes in the briquetting with a coal of moderate coking quality, if the manganese peroxide and acid be used in treating, for example, an ordinary commercial coal-tar in the proportion of 2 to 1 of peroxide of manganese and sulphuric acid, that a result possessing the best combination of the characteristics required is attained. For every 1 per cent. of the acid added to the tar treated with the manganese there is a fall in the temperature equal to approximately 5° C., to which it is necessary that the tar should be finally heated when treating it to prepare the material for use as a binding medium. By this means the quantity of oil retained in the material may be regulated and the resultant degree of tenacity and ductility governed. A substantially constant result may be attained by varying the temperature and the quantity of the manganese and acid, at the same time preserving the ratio between the peroxide of manganese and acid.

As an example of this, the following table is appended, in which, although the temperature and quantities are varied, the product is substantially the same:—

Tar.	Manganese.	Acid.	Temperature.
70 ..	20 ..	10 ..	155° C.
85 ..	10 ..	5 ..	180°
91 ..	6 ..	3 ..	190°

It will be seen that the quantity of tar is altered proportionately. The proportions, however, of manganese to acid may be increased—as, for instance, when treating the tar to bind coke or coals possessing very low coking properties. On the other hand, where the coal possesses high coking properties, the proportions may be equal, or the acid even preponderate.

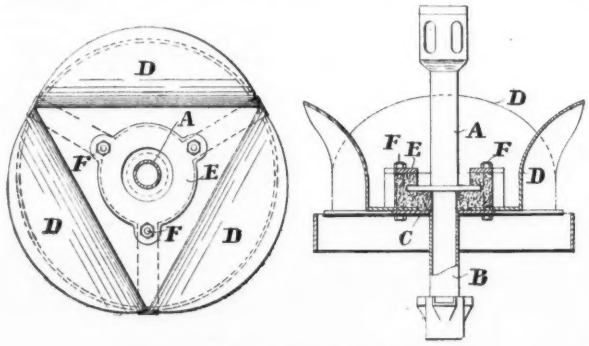
In practice, when treating the tar (say, for example) with 10 per cent. of manganese peroxide and 5 per cent. of sulphuric acid, the tar is first heated to render it sufficiently fluid, and the manganese peroxide added preferably in the form of a powder and well stirred in; and, preferably while the temperature of the tar is still sufficiently low to prevent the evaporation of the volatile oils—say, 50° to 60° C.—the acid is added and also stirred in. The temperature is then raised to 180° C.; and this temperature is maintained until the evaporation is very slight—in fact, in practice this is found to be about ¼ per cent. for the last quarter-of-an-hour for which the mixture is subjected.

Inverted Incandescent Gas-Burners.

TURNER, A., of Amersham, Bucks.

No. 20,153; Sept. 10, 1907.

This is a gas-burner in which the tube conveying the mixture of gas and air to the mantle is divided into two sections—one provided with a flange or other projecting part imbedded in a block of insulating material.



Turner's Inverted Incandescent Burner.

The two sections A B of the burner-tube are provided with flanges—that on the upper section being imbedded in a block C of asbestos, magnesia, or other insulating material of considerable thickness. The lower face of the block bears partly against the upper surface of the lower flange and partly against the upper surface of the deflector D, formed, as shown, of a central flat part and three upwardly bent wings. E is a metal washer or ring, the internal orifice of which is of considerably greater diameter than the exterior of the burner-tube, so that a wide space is left between the inner edge of the ring and the upper section of the burner-tube. The ring is secured to the deflector; and the insulating joint is completed by means of screwed bolts F passing through the block C and nuts G, or by rivets, or other equivalent means.

This arrangement may be modified either by securing the flange of the lower section of the burner-tube on the upper face of the deflector or by screwing the section into the deflector, which would then act as a flange to the lower section.

The insulating material is preferably made of asbestos board, first moistened and then consolidated into a block by pressure.

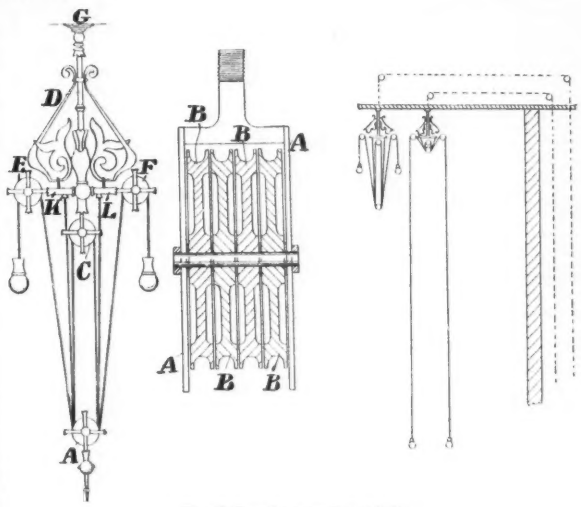
By the use of this insulating joint, the lower or nozzle portion of the burner-tube can be raised to a high temperature (or superheated), while the upper section remains cool. Moreover, as the joint is hidden by the deflector, it is not unsightly.

Suspending Apparatus for Lamps in High Buildings.

REES, C., of Warrington, Lancs.

No. 13,300; June 8, 1907.

This invention relates to means for enabling lamps employed to illuminate the interiors of high buildings—such as the interiors of domes of public halls and the like—to be raised or lowered from the floor beneath, for the purpose of renewing or cleaning, so as to avoid the necessity of a person having to ascend to a height for the purpose of attending to what is required. The arrangement consists in the adaptation of a specified number of rollers or pulleys with sheaves of diameters calculated to enable lights to be lowered from, or raised to, a considerable height without the suspending connections being visibly affected.



Rees' Gas Suspension Light.

A travelling counterbalance pulley A, with a number of sheaves B of a diameter calculated to take up the flexible connections when wound on it are made of a length when unwound to permit the lamps to be lowered to the floor of the building. C is a like pulley connected to the fixed bracket D. The pulleys E and F, which are connected to the bracket D, are for the purpose of giving the necessary spread to the fitting. The main supply is connected to the bracket at G above the ceiling, and the flexible connections are united to the bracket at K and L. The tubing containing the gas connection passes down from K, round the pulley A, upwards over the pulley C, and round these two pulleys on different sheaves as many times as may be necessary to give the length required; thence passing over the pulley F—the lamp being suspended from the end. The corresponding tubing attached to the bracket L is carried over the pulleys A and C in like manner, and then over the pulley E; a lamp being suspended from the end of the tubing or flexible connection.

Gas-Meters.

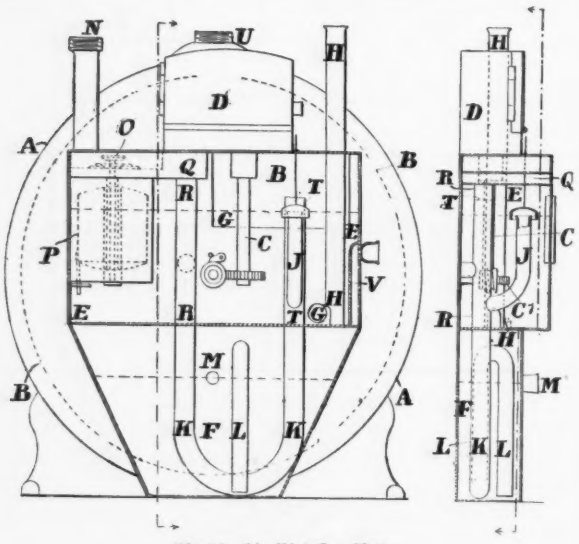
PINCHBECK (the late), J., of Holloway, N.

No. 16,155; July 13, 1907.

This invention relates to improvements in wet gas-meters of the type in which the water is supplied to the chamber containing the measuring drum through a second chamber opening directly into it, and supplied with a down-flow pipe leading to a third chamber below the second, down which pipe the water flows when the measuring chamber and second chamber are full. This down-flow pipe is connected to the gas inlet-pipe by a U-tube extending down to the bottom of the third chamber; and to the bottom of this tube is connected a syphon pipe, so that water flowing down the down-flow pipe rises in the gas inlet-pipe and also in the syphon pipe by which the third chamber is filled to the level of the usual outlet. It is preferable also to connect the down-flow pipe to a stand-pipe opening into the second chamber above the mouth of the down-flow pipe, which mouth is covered by a cap whose rim projects slightly below the mouth—the effect being that a comparatively large increase in the pressure of the gas may occur without any of the water escaping by the down-flow pipe.

The illustration (p. 644) shows an ordinary gas-meter modified in accordance with the invention.

The spindle of the drum B carries a worm gearing with the worm



Pinchbeck's Wet Gas-Meter.

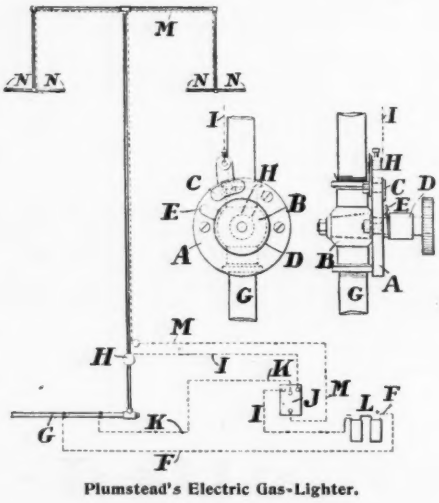
wheel on the spindle C, which actuates the counting mechanism contained in the chamber D. E and F are chambers containing water. The chambers A and E communicate with each other by openings G; and the water level in both chambers is the same—being indicated by the top dotted line. The lower dotted line indicates the water level in the chamber F. Water is supplied to the two chambers by the pipe H, and rises in them until it reaches the top of the down-flow pipe J, down which it flows and passes, by the U-tube K and syphon pipe L, into the chamber F, which it fills as far as the overflow outlet M. N is the gas inlet leading to a valve O operated by a float P in the chamber E, by which gas is admitted to the chamber Q. This chamber is connected by a pipe R to the U-tube K, and by a branch pipe to the measuring drum B. The gas passes from the measuring drum into the upper part of the chambers A and E, and is led away by the outlet pipe U. The pipe J is connected to a stand-pipe T opening above the mouth of the pipe J, which mouth is covered by a cap whose rim projects slightly below the mouth. V is an escape passage for air leading from the top of the chamber F.

Igniting Gas Electrically.

PLUMSTEAD, E., and NEWTON AND LAWRENCE, LIMITED, of Norwich.

No. 14,162; June 19, 1907.

This invention relates to a device wherein during the movement of the gas supply cock from the closed to the open position a contact arm carried by the plug is moved over an insulated contact and an electric circuit is completed, the igniter brought into action, and the circuit broken again.



Plumstead's Electric Gas-Lighter.

The illustration shows in front and side elevation a portion of a gas-pipe with the tap and switch fitted to it; also a diagram illustrating a mode of arranging the electrical connections for co-operating with the tap-switch.

This switch comprises a disc A, of non-conducting material, mounted on the casing B of the tap and having a contact stud C arranged in an electric circuit. On the handle D of the tap-plug is a brush E, which rubs over the contact stud as the gas is being turned on and temporarily completes the electric circuit. Igniters (not shown) are provided at each burner—preferably consisting of German silver wires arranged a suitable distance apart. The igniters are caused to spark by the secondary current of an induction coil, the primary of which is in the circuit which comprises the gas-tap contacts already referred to.

In the diagram, L is a battery and F I is a primary circuit comprising an earth return through the gas-pipe G and the primary winding of the induction coil J. In this primary circuit F I is placed the switch H. K M is the secondary circuit, comprising the igniters attached to the burners N. By turning on the gas-tap, the circuit is temporarily closed at the switch and the working of the coil is effected; but the latter, because of the arrangement of the switch, only remains in action long enough to ignite the gas simultaneously turned on. One wire from the secondary winding of the coil is also connected to earth to save the running of two wires, also for convenience. The other necessary secondary wire, being highly insulated, is run through the house; a connection being taken off as wanted for each room.

Manufacture of Gas and Coke.

HANSFORD, J., of Portland, and GIBBONS, W. P., of Palace Chambers, Westminster, S.W.

No. 23,202; Oct. 21, 1907.

The primary object of this invention is the production of fuel "more suitable for domestic and many other purposes than gas coke as now generally made." The fuel is obtained by the partial combustion or distillation, in "a suitable retort or coking oven," of a mixture of coal and peat which have been previously broken up without being pulverized, so that "a fairly intimate mixture of the two constituents of the retort charge may be obtained." The proportions of the mixture may vary widely—the character of the resulting fuel varying accordingly; but a mixture in the proportion of about three or four parts of coal to one part of peat by weight has been found to produce an excellent fuel for ordinary domestic use. A softer and less dense fuel is obtained by using a mixture of about five parts by weight of coal to two of peat. The character of the coal used may also vary, as practically any kind of caking or coking coal or slack can be employed in the production of the fuel; but when (as would usually be the case) the fuel is produced simultaneously with the gas for illuminating purposes, good gas coal would preferably be employed."

The actual process of converting the mixture of coal and peat into the fuel desired does not differ, the patentees remark, from that involved in the production of coke and illuminating gas; the mixture being charged into the retorts in the usual way and distilled at the usual temperature of such retorts as are used in the production of illuminating gas for a period which may vary, but is usually considerably less than that required for the complete distillation of a similar charge of gas coal, after which the charge is withdrawn from the retort, quenched with water, and drained. The temperature of the retorts, and the period of treatment, may vary considerably—the one depending to some extent on the other, and one or both on the proportions of peat and coal in the mixture and on the character of the materials used.

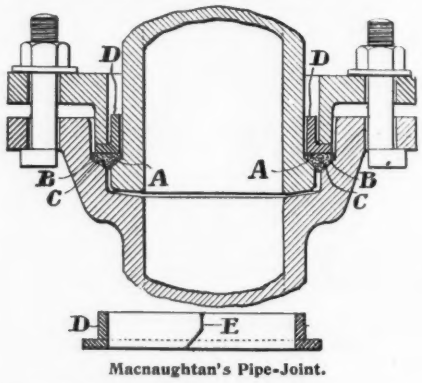
While, therefore (the specification proceeds), there is no difference in the process from that commonly employed in the production of illuminating gas and coke except that the period of distillation may be reduced, the fuel obtained differs widely in character from ordinary coke in that it is considerably less dense and of increased porosity, having a cellular structure which is so open as to allow of its ready combustion in an open fire. The manner of producing the fuel, however, does not involve the reduction of the temperature of the retort, nor the arrest of the distillation process before its completion; and, consequently, the manufacture of the fuel can be prosecuted and effected in ordinary gas-works plant simultaneously with the production from the same materials of gas for illuminating purposes, and without involving any interruption, diminution, or retardation of the generation of the gas for the ordinary purposes of supply.

Pipe-Joints.

MACNAUGHTAN, W. C., of Glasgow.

No. 1883; Jan. 28, 1908.

This pipe-joint is of the type described in patent No. 12,553 of 1906, where a divided, stepped, or scarphed ring of less internal diameter than the external diameter of the spigot end of the pipe, and bearing, when in position, on a packing ring which rests half upon a shoulder on the spigot end of the pipe and half upon a shoulder in the faucet end of the pipe, is used. A gland capable of being passed over the spigot end presses upon the divided ring and serves to bind the whole together. The divided ring is made of angular section, having one web in diametrical, the other in axial, plane (a flat ring with an internal axial flange); and it will be seen that "the addition of the axial flange serves not only to guide the ring into position when the joint is being assembled, but also lends itself to the formation of a much more effective joint between the different parts of the ring."



Macnaughtan's Pipe-Joint.

The spigot end of the pipe is formed with an external collar A. Half on it and half on a step B (in the faucet ends) there bears a ring or gasket C of packing material. Upon the gasket there bears the scarphed divided angled ring D, which is the subject of the present

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See "Gas Journal," Jan. 22, 1907, p. 216; "Gas World," Jan. 26, 1907, p. 115.

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LATEST DESIGN.

invention. The whole is fixed together by a follower ring bolted to the flange on the faucet end of the pipe. The angled ring is made in any number of parts with joints E, of scarph-like form, between its several parts—that is to say, in the lateral web of the ring and a proportion of the longitudinal the abutting parts of the joint are angled; while the remainder of the joint is in an axial direction.

Rotary Gas-Meters.

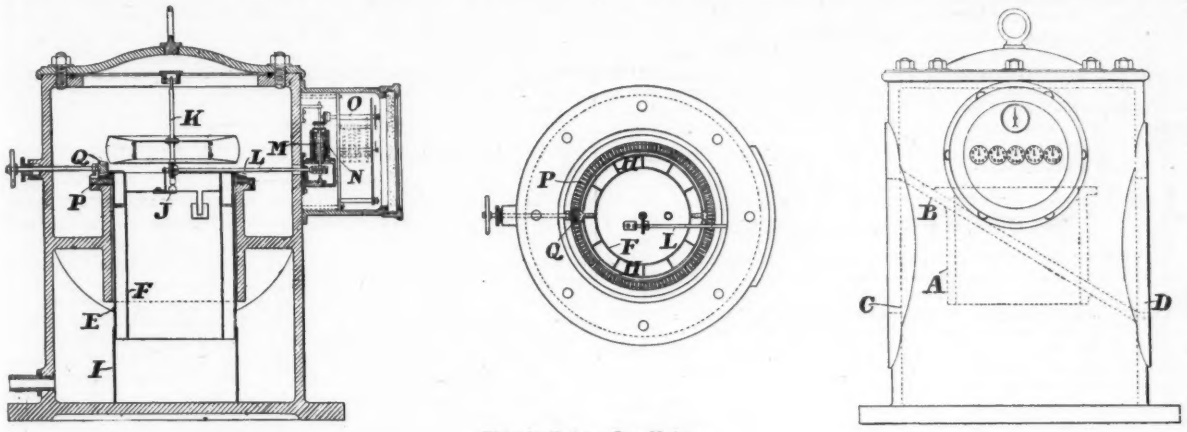
THORP, T., of Whitefield, near Manchester.

No. 28,343; Dec. 24, 1907.

This invention relates to gas-meters described in patents No. 20,214 of 1901 and No. 9602 of 1904, and consists in improvements the object of which is to minimize the deposit of oily matter in the guide-passages and to facilitate their cleaning.

The casing of the meter, the same as in the patents mentioned above, is made with an internal cast-iron cylinder A and an inclined partition plate B, dividing the inlet C from the outlet D. Into the central cylinder the two cylinders E F are placed; the former being bolted to the top flange of the cylinder A. The two cylinders are connected by radial webs forming passages for the gas. The webs reach to the bottom of the cylinders but stop short at some distance from the top, so as to leave a clear annular space between the cylinders. A perforated cylinder I reaches from the lower part of the cylinder E to the bottom of the casing. The inner cylinder F is closed near to its top by a plate, which supports the foot-step J at the turbine or fan-wheel spindle K. The wheel is arranged above the cylinders with the centre of its blades approximately above the centre line of the annular space between the cylinders E F. The top bearing of the spindle is fixed to a bar dropped with its ends into a recess of the top flange of the casing and secured by the cover bolted to this flange.

The registering index, instead of being arranged at the top of the cover, is placed at the front of the meter casing. A worm on the fan-wheel spindle drives a worm-wheel on a horizontal shaft L that passes through the wall of the casing into a small box bolted to it, and (by a



Thorp's Rotary Gas-Meter.

worm and worm-wheel) transmitting the motion to a vertical spindle M to which a bell is fixed, which dips into mercury contained in the annular cup N, and thereby seals the spindle. Bevel-wheels transmit the motion to the spindle O of the units finger, from which the other fingers of the index are actuated in the usual manner.

Preferably scrapers worked from the outside of the meter-casing are provided for scraping from time to time any deposit of oily matter off the walls of the annular space below the fan-wheel, and which scrapers may be arranged in any suitable manner. In the arrangement shown, an annular bevel-wheel P rests on the flange of the cylinder E, and is provided with a ledge fitting the bore of the wheel P. To the latter two or more scrapers are fixed, which reach down near to the top of the webs. A bevel pinion Q gears with the wheel P, and is fixed on a shaft that passes through a stuffing-box on the casing, and is provided with a hand-wheel by means of which the wheel and scrapers can be rotated.

APPLICATIONS FOR LETTERS PATENT.

10,573.—NUTTALL, L. W., "Hydraulic main arrangement." May 20.
10,741.—WOODMANSEY, A., "Water-meters." May 18.
10,751.—CLARK, R. O., "Pipes to stand a high pressure." May 18.
10,781.—ENGLAND, R., "Sulphate of ammonia." May 18.
10,782.—EBERHARD, T., "Gas-regulating nozzle for inverted lamps." May 18.
10,798.—WEST, J., "Bucket conveyors." May 18.
10,800.—THOMAS, W., "Gas pressure-gauge." May 18.
10,822.—HARGREAVES, J., "Gas-engines." May 19.
10,856.—COTTON, F. T., "Electric ignition of inverted incandescent gas-burners for street lighting." May 19.
10,901.—BURSTALL, F. W., "Gas-washer." May 20.
10,906.—WILLIAM BEARDMORE AND CO., LTD., MOORE, Q., Jun., CUNNINGHAM, J., and STOKES, J. W. B., "Production of recoverable ammonia in the manufacture of producer gas." May 20.
10,932.—HARRISON, C. W., "Inverted lamps." May 20.
11,006.—WRENCH, W. G., "Pressure-reducing valves." May 21.
11,034.—GÖDELMANN, N., "Mantles." May 21.
11,047.—JABS, A., "Gas-engine plant." May 21.
11,055.—THOMPSON, W. P., "Acetylene burner cleaners." A communication from D. Barnard. May 21.
11,062.—PAYNE, S., "Manufacture of retorts, &c." May 21.
11,071.—HARRIS, A. E., "Burners." May 21.
11,072.—EWART, G. H., "Geysers." May 21.
11,122.—LAKE, H. W., "Incandescent burners." A communication from Neue Kramerlicht Ges. m. b. H. May 22.
11,126.—WEBBER, J., "Globes." May 22.
11,138.—KOUMEAS, J. P., "Controlling the supply of gas." May 22.
11,152.—COHN, S., "Tying mantles." May 22.
11,184.—LAYTON, A. E., and WHITE, E., "Anti-dip valves." May 23.
11,272.—HOLMES, P. F., and HOWELL, H., "Plug cocks or taps." May 25.
11,284.—FERGUSON, A., "Ferrule for connecting lead with hard metal pipes." May 25
11,287.—CLARE, J., "Prepared tar for roads." May 25.
11,301.—FELSTEAD, E. C., FINNEY, F. C., and LAMOND, R. C., "Incandescent light economizer." May 25.
11,323.—MARTIN, M., "Fluid gauges." May 25.
11,349.—SMITH, W. B., "Inverted burners." May 25.
11,360.—KOSCH, C. T., A., & O., "Gas-stoves." May 25.
11,389.—TAGGART, E. E., and CRARY, W. P., "Acetylene generators." May 26.
11,412.—SEEHAUSEN, O. J., "Generator for hydrocarbon lighting systems." May 26.
11,423.—BROADBENT, A., "Preventing theft from coin-operated meters." May 26.
11,433.—LANTONNOIS, G., "Pressure controllers." May 26.
11,459.—GÜTTLER, M. R., "Gas-driven turbines." May 26.
11,519-20.—WATERS, W., "Glass chimneys." May 27.
11,533.—THOMAS, W., "Gas-producer." May 27.
11,540.—ZVONICEK, J., "Gas-turbines." May 27.
11,543.—GRIMSDELL, E. W., "Gas-burners." May 27.
11,546.—MAZZA, E., and MURIETTA, C. DE, "Separating the components of gaseous mixtures." May 27.
11,586.—HEINRICHSDORFF, C., "Igniting carriage gas-lamps." May 28.
11,617.—SCOTT-SNELL, E., "Compressing and carburetting air for heating and lighting purposes." May 28.
11,635.—FRANCIS, A. S., "Inverted burner." May 28.
11,755.—HAMMOND, F., "Instantaneous water-heater." May 30.
11,793.—DELAGE, M., and WOOG, P., "Removal of air from gas-pipes." May 30.

Stafford Gas and Electricity Supply.

The reports for the past year submitted recently to the Stafford Town Council showed that the gas delivered from the works was 197 million cubic feet—an increase of over 6 million feet. The receipts from sales of gas were £24,823 (an increase of £1041), and from residual products £7923 (against £6953); the total revenue being £33,965, and the expenditure £18,038—leaving a gross profit of £15,926, compared with £15,083 in the previous year. After meeting the capital charges, there was a net available balance of £5987, or an increase of £994. The Committee had placed £2000 of the surplus to the credit of the district fund account in reduction of the rates; and £2000 had been transferred to the suspense account in reduction of the cost of the water-gas plant. The Committee had also added £1132 to the reserve fund. In regard to the electric lighting works, the total revenue was £4371 (as compared with £3971), and the expenditure £1784 (compared with £1526); the gross profit being £2587 (against £2445). The capital charges amounted to £2090. In order that the accounts of the department might be placed on a satisfactory footing, the Committee asked for a contribution from the rates of £1148, which was equal to the amount of the loans repaid. The Committee further recommended that, in pursuance of the arrangement as to profit-sharing by the employees, a bonus of £548, representing nearly 9 per cent. on the wages, be paid to the clerks and workmen of the Gas Department in respect of the past year's working; and a similar recommendation was made with regard to the officers and workmen of the Electricity Department—the amount in their case being £66 18s., representing 7¼ per cent. on the wages paid.

Wadebridge Gas-Works Offered for Sale.—At the meeting of the Wadebridge Urban District Council last Tuesday, a letter was read from Mr. E. G. Martyn, asking whether the Council were prepared to purchase the gas-works of which he is the Engineer and Manager, and also part proprietor. Mr. Nancarrow thought that if the Council were still to have gas they would want something more modern than the present works. It was decided to write to Messrs. Oatey and Martyn (the owners of the works) to the effect that the Council were not in a position to entertain their offer at present.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Sautter-Harle Coal Injector.

SIR,—In the number of the "JOURNAL" for the 19th of May, I notice a description of the so-called patent coal "injector" made by Messrs. Sautter, Harlé, and Co. This injector is, of course, nothing but the well-known De Brouwer patent coal-projector, constructed in England by Messrs. W. J. Jenkins and Co., Limited, of Retford, who have the exclusive right to make and sell my patent in the United Kingdom and all its dependencies. The machine itself and its method of operation are the same as my patent coal-projector, and therefore Messrs. Sautter, Harlé, and Co. have made no invention, and any user of the machine in England will be an infringer of my rights.

I leave to Messrs. Sautter, Harlé, and Co. the particular means for regulating the speed of the motor. Every gas engineer is able to judge for himself how far such regulation may be effective or desirable. But if Messrs. Sautter, Harlé, and Co. are curious on the subject, I recommend them, whenever they have occasion to place their apparatus in England, to call upon Messrs. W. J. Jenkins and Co., who will be able to show them several methods of doing the same thing automatically for the same purpose.

Bruges, May 25, 1908. J. DE BROUWER.

The Gasholder Tank at Sheffield.

SIR,—In the discussion on Mr. Frith's paper, "On the Cost of the Construction of a Concrete Gasholder Tank," I am incorrectly reported on p. 567 of your last issue, as stating "that if the tank was made for a spiral holder the cost per 1000 cubic feet of gasholder capacity would be increased, and that we had recently built one in Sheffield and the cost was £5 per 1000 cubic feet." What I did say was: "If a spiral gasholder is put into a tank, the cost of the tank would be much cheaper, because tank guides and supports for the crown of the holder would not have to be provided. In the case of the tank recently built at Sheffield these items amounted to about 5s. per 1000 cubic feet of gasholder capacity."

JOHN W. MORRISON, Engineer,
Sheffield United Gaslight Company.

Sheffield, June 5, 1908.

Right and Left Hand Gas-Valves.

SIR,—The letter in your columns this week from Mr. Drury, I think, will not carry to the minds of anyone who may be in doubt that convincing element necessary to show wherein his argument may be right—fact is, it is not right, but left.

As popularly understood, the sun rises, and must do so before it sets, or shuts down. So a valve must be opened before it can be closed. What, then, can be more natural than an arrangement by which all gas-valves be opened "with the sun," and thereafter closed "against the sun."

The heading of this correspondence is enough to convince anyone. Gas-valves should be first opened by "right;" then by "left" to close. It is enough on our part that an attempt be made to standardize gas-valves. Recommendations such as Mr. Drury has suggested only make confusion worse confounded.

Ceres, Cupar, Fife, June 3, 1908. WILLIAM KEY.

The Institution Balloting Lists.

SIR,—If the correspondent who signs himself "A Would-be Serious Voter" had taken the trouble to make himself acquainted with the rules of the Institution, I do not think he would have made the remarks which appear above his *nom-de-plume*. No. 40 of the Articles of Association is the following:—

> "It shall be open for any three members or associate members to propose any other member or associate member as an ordinary member of Council—the consent in writing of such member or associate member having been first obtained. If such proposal be duly made in writing and delivered to the Secretary, together with the written consent of the member proposed, not later than two months previously to the annual general meeting, the Council shall accept the nomination and add the name of the person so proposed to the balloting list."

"A Would-be Serious Voter" says: "Surely, for at least members of Council, there ought to be more candidates than vacancies." He certainly may be right; but why did not he and others exercise the powers given them under the article quoted above, and thereby secure the desired result? It is, however, a fact that prior to the meeting of the Council at which nominations were considered, only one such nomination had been received.

With regard to "A Would-be Serious Voter's" remarks that "19 out of the 33 candidates hail from North of the Tweed," I may say that the numerous nominations from Scotland was the result of the recent affiliation with the North British Association of Gas Managers, which carried with it the right of nomination of members of that Association duly qualified under our rules.

I need hardly say that each application for membership received individual and careful attention from the Council, who in deciding as to the eligibility of the candidates had many points to consider other than the mere question as to whether they were or were not "managers at well-known towns," and which points the writer of the letter could easily have made himself acquainted with if he so desired by studying article 6 *et seq.*

39, *Victoria Street, S.W., June 5, 1908.* WALTER T. DUNN, Secretary,
The Institution of Gas Engineers.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress had been made with Bills when the House rose on Monday last week till Tuesday, the 16th inst.:—

Bills reported, with amendments: Keighley Corporation Bill, Lincoln Corporation Bill, Ravensthorpe Urban District Council Bill.

The Select Committee on the Llanelly and Burry Port Water Bill reported that it was not expedient to proceed further with the measure.

HOUSE OF COMMONS.

The following further progress had been made with Bills down to last Thursday, when the House rose for the Whitsuntide recess:—

Bill reported, with amendments: Burnley Corporation Bill.

Bills read the third time and passed: Llanelly Gas Bill [Lords], Padiham Urban District Council Bill.

SWINTON AND MEXBOROUGH GAS BILL.

This Bill, the object of which is to incorporate and confer powers upon the Swinton and Mexborough Gas Company, was recently before the Lord Chairman of Committees (the Earl of Onslow) as an unopposed measure. His Lordship said that he had received a letter from the Home Office stating that the Department were not satisfied with clause 60, which relates to the charge for gas supplied by means of prepayment meters. The Home Office expressed the opinion that the objections they had raised to the clause had not been met. Mr. Baker, the Parliamentary Agent for the promoters, explained that when the Bill was before a Select Committee of the House of Commons evidence was given on the clause, and it was passed in the form in which it now appeared. Lord Onslow remarked that, in view of the letter from the Home Office, he could not allow the measure to proceed. He suggested that the Agent should see him with regard to the matter. Further consideration of the Bill was postponed to enable the suggested interview to take place.

LEGAL INTELLIGENCE.

GAS TESTING AND QUALITY AT BRENTFORD.

High Court of Justice—King's Bench Division.—Monday, June 1.

(*Before the* LORD CHIEF JUSTICE *and* JUSTICES DARLING *and* SUTTON).

Their Lordships had to-day before them a special case stated by the Magistrates sitting at Chiswick, who on the 21st of January last, convicted the appellants on two summonses for supplying gas deficient in illuminating power, and inflicted two penalties of £10 each, with £105 2s. 6d. costs. (See "JOURNAL" for Jan. 28, p. 244.)

Mr. DANCKWERTS, K.C., and Mr. R. J. NEVILLE, instructed by Mr. H. E. Griffith, appeared for the appellants; Mr. CLAVELL SALTER, K.C., and Mr. TRAVERS HUMPHREYS (instructed by Messrs. Lees, Butterworth, and M'Donnell) represented the respondents.

When the case was called on,

The LORD CHIEF JUSTICE said he was a shareholder in the appellant Company, but he did not remember the amount of his holding.

Counsel on each side having waived any objection to this, the hearing proceeded.

Mr. DANCKWERTS said the case raised the questions of how the gas supplied by the Company was to be tested for illuminating power, and the burner to be used for the purpose. The Company originally supplied gas under their Act of 1858, which prescribed an illuminating power of 12 candles, subject to certain exceptions in case of frost, &c. In 1868 an amending Act was passed, which repealed the provisions as to illuminating power in the former Act, and substituted as the standard 14 candles, when tested in an argand burner having 15 holes and a 7-inch chimney, and consuming 5 cubic feet per hour. In 1871 the Gas-Works Clauses Act was passed, which included certain provisions in regard to illuminating power; and one of the questions to be decided would be how far the Act of 1868 might or might not be affected by the Act of 1871. He should submit that the later Act did not affect the matter, because the Local Act prevented it applying. In 1881 a Provisional Order was obtained giving extended powers to the Company, and also authorizing the Chiswick District Council to provide a testing-place, with apparatus in accordance with the Act of 1871. But it did not say that any consequences should follow; and it might be a question how far any tests made at this testing-place were of any validity for the purpose of imposing a penalty. The main question, however, was as to the burner used. Counsel proceeded to read the principal parts of the special case. It set out the material sections of the various Acts, including section 36 of the Brentford Gas Order, 1881, giving power to the Local Authority to provide a testing-place and appoint a duly qualified gas examiner; and under it Mr. F. F. Shelley had been selected. On Oct. 10, 1907, he made a test, consisting of ten observations, the average illuminating power being 11·13 candles, corrected for temperature and pressure. On the 15th of January last, a similar test was made, when the average illuminating power was 11·24 candles. In making these tests, the Examiner used an argand burner known as the Sugg-Letheby, which at the time of the passing of the

Act of 1868, was the best burner known for testing illuminating power. Since that date, however, considerable improvements had been made in the burner. On Oct. 10, the appellants made at their works at Brentford one of their usual nightly tests; and the illuminating power of the gas shown was 14·04 candles. On the same evening, the appellants also tested the gas at the Chiswick testing-place; and it showed 14·1 candles. On Jan. 15, similar tests were made by the appellants at their works and at Chiswick; and the illuminating power was 15·2 and 14·62 candles respectively. All the gas came from the same source. The burner used by the appellants was an argand burner having 15 holes with a 7-inch chimney, consuming 5 cubic feet of gas per hour; but this burner was an improvement upon the Sugg-Letheby burner used by the respondents, and was known as the "Brentford" burner. It was invented by Dr. Letheby subsequent to 1868, and was used by him under the provisions of the Brentford Gas Act of that year for testing gas on behalf of the Vestries of Barnes and Mortlake. It was found as a fact that the tests made by the appellants would have shown the gas to be of less illuminating power than 14 candles if the Sugg-Letheby burner had been used. Other burners had since been invented which complied with the requirements of section 21 of the Act of 1868, which were improvements on the "Brentford" burner, and which improved the value of the gas considerably, as compared with that burner. It was proved or admitted that the composition and method of manufacture and use of gas had materially changed since 1868. It was also proved or admitted that the burner prescribed by section 58 of the Brentford Gas Act, 1858, was described in terms identical with those contained in section 21 of the Act of 1868, but that the Sugg-Letheby burner used by the respondents for testing developed a greater illuminating power than the burner in use at the passing of the Act of 1858. The appellants contended that section 36 of the Order of 1881 did not give the respondents power to conduct at the Chiswick testing-place tests upon the result of which penalties could be imposed; and, further, that the burner employed by the respondents was not a burner by the use of which the appellants could be subjected to a penalty, and that the testings ought to be made with such an argand burner as would give the best result at the time of the testing. The Magistrates were of opinion that the burner referred to in section 21 of the Act of 1868 was the best burner corresponding to the description known at the date of the passing of the Company's Act. They therefore overruled the appellants' contention, and inflicted the penalties. The learned Counsel went on to point out the importance of securing perfect combustion of the gas passing through the burner, which was greatly affected by the size of the holes. He said that when gas was burnt under high pressure, it gave a poor light, and blackened the ceiling. These Acts ought to be approached from the point of view of the public, who wanted to burn gas so as to get the most light out of it. If the Gas Company had to have their gas tested by something which was no longer in practical use, and the public burnt it by what was in practical use, the real object of the Act was not attained, which was that the public should have gas which, with the ordinary burner of improved pattern, would show 14-candle power. He submitted that the best burner known at the time—provided it answered the description—was the proper one to use. In the Act of 1868, the quality of the gas was raised from 12 to 14 candles, and the exception with regard to frost, &c., was repealed. It was further to be borne in mind that nowadays it was almost impossible to get cannel coal, and ordinary coal gas had to be enriched by other means—principally petroleum gas; and this led to the necessity for improving the burner. It could not be supposed that Parliament intended to impose on the Gas Company for all time the form of burner which happened to be in use at the time of the passing of the Act, and which might afterwards be found to be constructed on wrong principles. The same thing would apply to the test for purity. Suppose a more effective way of testing for the presence of sulphuretted hydrogen were discovered, ought not this to be employed instead of the means described in the Act?

The Lord Chief Justice said the question seemed to be whether the Company were tied down to the burner as known before 1868 without further improvement. There was nothing in the Act specifying the size of the holes.

Mr. Salter, for the respondents, said this was undoubtedly an important point; and the first question to consider was whether Parliament intended to impose a fixed standard once for all. It described a mechanism well known to everyone at the time—an argand burner of a certain size; and with it certain tests were to be made.

The Lord Chief Justice said it did not fix the size of the holes. Assuming that a new argand burner with larger holes would give much better results, why might not the Company use it?

Mr. Salter said the Company were not selling light, they were selling gas; and they had to sell gas of a certain quality, which would contribute, with something provided by the customer, to produce light. If the Company sold light, they might reasonably say: "We have to give you a certain intensity of light for so much money; and it does not matter to you whether we give you a good burner and poor gas, or better gas and an inferior burner, so long as you have the degree of light to which you are entitled." But it was the customer who provided the burner; and what the Company claimed was this—that as soon as a more efficient burner was devised which more cleverly mixed the gas with the air, but still being an argand burner having 15 holes, &c., they were entitled to continuously reduce the quality of the gas while maintaining the price, and throw on the customer the obligation of always keeping himself provided, at his own expense, with the latest thing in burners. He submitted that the Legislature intended that the customer should get the benefit of any improvement in burners which might be devised; and this view was supported by the fact that in the Act of 1868 the illuminating power was raised from 12 to 14 candles, the burner having been improved since 1858.

Justice Darling suggested that this was against Mr. Salter's contention, because when Parliament intended to give the customer the benefit they said so, by raising the standard. The inference would be that any future improvement in burners would be for the Company's benefit.

Mr. Salter said he was told that the difference in the burner which had taken place between 1858 and 1868 was in the material of which the top was composed. He suggested that it was not a reasonable construction of the Act to say that Parliament intended, in prescribing the quality of gas to be supplied, to say that this quality should continually fluctuate, according to the improvement in burners.

The Lord Chief Justice said what troubled him was this: "The Act said nothing about the size of the holes in the burner. Why should not the gas be tested by a burner answering the description, but with larger holes?

Justice Darling pointed out that Parliament was dealing with a thing which varied before and might be expected to vary again.

Mr. Salter said the size of the holes was in one sense an accident. He submitted that it was the intention of Parliament to lay down once for all a then existing standard which must be maintained. They stereotyped the argand burner as it then existed; and in consideration of its light-producing capacity they raised the candle power from what it had been previously, instead of lowering the price. He could not carry the case any further.

The Lord Chief Justice, in giving judgment, said he thought the contention of the Company was correct. He admitted that the point was one of great difficulty and importance; and he rather wished the case had been so framed that his opinion could be tested if it were thought desirable, which he was afraid it could not in the present instance. He agreed with Mr. Salter that if a known standard had been prescribed, and the customer could, by the expenditure of his own money or ingenuity, get a higher illuminating power out of the gas supplied, the Company could not claim the benefit of it. This had been turned to practical effect in modern times by burning gas in connection with mantles and bunsen burners; and therefore it was plain that all new burners were not available for the purpose of enabling a gas company to say they were fulfilling their statutory obligations. In the year 1858, an argand burner with 15 holes and a 7-inch chimney, consuming 5 cubic feet of gas, was thought to produce a light equal to 12 sperm candles of six to the pound. The same description of burner in 1868 was thought to be capable of producing, under normal conditions, a light of 14 candles. It was quite possible that part of this increase might have been due to improvement in the burner—in fact, the case said it was proved or admitted that the burner prescribed by section 58 of the Act of 1858 was described in terms identical with those contained in the Act of 1868, but that the Sugg-Letheby burner used by the respondents developed a greater illuminating power than the burner in use at the time of the passing of the Brentford Gas Act of 1858. Mr. Salter's argument necessitated that, at any rate after 1868, the argand burner used for the purpose of testing must not be altered. If he could find that all the conditions of the argand burner were sufficiently described in the Act to prevent it being improved, he should be inclined to agree. But it must be remembered that, rightly or wrongly, Parliament had only limited the Company by certain specified things—for instance, the quantity of gas (5 cubic feet per hour), the number of holes, and the size of the chimney. He believed it was the fact that great differences arose from a variation in the size of the holes in the burner. The question was whether the gas issued slowly, and mingled slowly with the air, or issued more rapidly, owing to being forced through smaller holes, in order that 5 cubic feet might be consumed in the hour. If the result was that the illuminating power of the gas was increased, he saw nothing to prevent the Gas Company or the Local Authority taking this kind of burner for the purpose of the test; and it was not without weight, in connection with this, that the new burner—the "Brentford"—had been used by a very competent authority for testing for illuminating power of gas after the Act of 1868 had been passed. Mr. Salter's difficulty was this—that if the Legislature were going to increase the obligation upon the Gas Company by saying that they should give more illuminating power in consequence of having improved the burner, they ought to say so by an Act similar to that which was passed in 1868; and he found nothing in the Act of 1871, nor in any subsequent Act applying to the Company, to indicate that they might not improve the argand burner. Of course, if it had been possible for the Magistrates to hold, on the evidence before them, that this was not an argand burner having 15 holes and so forth, the argument of Mr. Danckwerts would have been answered; but inasmuch as they had found, in effect, that it was a burner coming within the terms of the Act, and that, when consumed in this burner, which was one of the class described, the gas had a higher illuminating power than the 14 candles required, they ought not to have convicted the Company for supplying gas of insufficient illuminating quality. He desired to add that he attached no weight to the independent tests made by the Company at their own works. It was quite right for the Justices to state the facts with regard to this; but he thought it would be found, from what he knew of previous cases, that the tests taken by the gas examiners were those upon which the Justices should act. He decided the case on the ground that it was not improper to say that the gas must be tested through a known and recognized burner which came within the description in the Acts of 1858 and 1868. The appeal would therefore be allowed, and the conviction quashed.

Justice Darling concurred. He said it was material to notice that the test imposed on the Gas Company in the Act of 1858 was not that of a fixed and definite thing, such as a pint, a pound weight, or a yard measure. The test was that the gas should be burned in an argand burner having 15 holes, &c. The modern argand burner which the Company insisted they were entitled to use complied with every one of the requirements mentioned. It had 15 holes, a 7-inch chimney, and it consumed 5 cubic feet of gas per hour. Why did it not satisfy the test laid down in the Act of 1858? It was said that it was not the burner which was in existence in that year, which burner had been improved—improved, so far he gathered, out of existence altogether. He thought that when Parliament imposed this test they must have contemplated that the burner would not necessarily remain as it existed in 1858. That Parliament recognized this was made perfectly clear by the Statute of 1858 being, with regard to many sections, repealed in 1868, particularly the section relating to illuminating power; for where it had been enacted that the light should be equal to 12 candles, by the Act of 1868, section 21, Parliament enacted that the argand burner having 15 holes and a 7-inch chimney, &c., should give a light equal to 14 candles. What reason was there to suppose that the Legislature, with this before their eyes, did not contemplate that still further improvements would be made in argand burners? If the contention of the respondents was to be given effect to, it seemed to him

that these two Acts showed that it must be done by an Act of Parliament—that Parliament did not provide, when it had the chance of doing it in 1868, that in future that should not happen which had happened in the past, but that any kind of improvement in the argand burner should give no sort of advantage to the Gas Company, but should give to the consumer every advantage of which it was capable. So far, therefore, from being an argument in favour of the respondents, the contrast between the two sections referred to told distinctly the other way. The appeal must therefore be allowed.

Justice SUTTON said he thought the words "an argand burner" in section 21 meant any argand burner having 15 holes and a 7-inch chimney, providing it produced certain results. On this ground, he thought the appeal ought to be allowed.

The appeal was accordingly allowed, with costs.

Claim Regarding District Surveyor's Fees for Reservoirs.

At the Lambeth Police Court last Wednesday, before Mr. Horace Smith, a novel question arose on the hearing of a summons taken out by the District Surveyor for Camberwell against Messrs. Moran and Sons, Limited, contractors, of Westminster, for the recovery of a sum of £297 10s., fees alleged to be due under the provisions of the London Building Act. Mr. W. W. Williams appeared in support of the summons, and explained that the fees were claimed in respect of the construction by the defendants at Nunhead of two reservoirs for the Metropolitan Water Board. On Feb. 13, 1906, the District Surveyor received a notice signed by the defendants of their intention to construct the reservoirs in question. The work proceeded, and was visited by the District Surveyor from time to time for two years, and no objection was made to him going upon the works. Four reservoirs were designed; and it was in respect of two which had now been roofed in that the claim was made. The London Building Act did not contain a definition of a building, but it did contain one of "a building of the warehouse class;" and he invited the Court to say that these reservoirs came within the definition. The defendants having served the District Surveyor with notice, and invited him to go on the works for two years from time to time, he submitted that it was not now competent for them to say that these were works to which the Building Act did not apply. His Worship asked for a brief outline of the case for the defence. Mr. Munroe said a reservoir was not a building or structure within the Building Act, and that if it was a building or structure, it was constructed under the Special Acts of the Southwark and Vauxhall Water Company for the Metropolitan Water Board, and that the Building Act was ruled out, and the Special Acts prevailed. This was a point which had never been raised in London before. It was the first time any one had attempted to say fees were payable in respect of a reservoir. Mr. Ellis Marsland, the District Surveyor, gave evidence in support of his claim, and, in answer to Mr. Munroe, said that if they had been open reservoirs no fees would be payable. The hearing was adjourned until the 18th inst.

Gas Company's Property and Risks.

At the Old Street Police Court on the 25th ult., William and Mary Benson were charged with having been concerned in stealing a gas cooking-stove, value 50s., the property of the Gaslight and Coke Company. Mr. Humphreys, Solicitor to the Company, prosecuted. The evidence showed that the stove had been let on hire to a Mrs. Matthews. She had taken it for twelve months, and had removed it from a previous lodging to No. 251 Cambridge Road, Bethnal Green, by the Company's permission. There, however, she had no room for it, and it had stood in the yard for some time. Recently she removed from Cambridge Road to St. Mary Cray. She had employed the female prisoner as charwoman. On moving, she had given her some odds and ends of fittings, &c., but not the stove. She did not give notice to the Gas Company to remove the stove, as the twelve months' hire of it had not expired. Further evidence showed that two fitters in the employ of the Company saw the prisoners in Bethnal Green—the man pushing a hand barrow on which was the stove in question. A constable was spoken to, and he took him to the station for unlawful possession. The woman said she thought the stove was old iron, and that she was not doing any wrong. Her husband told her to take it. The man said he did not think he was stealing anything. Both prisoners were committed to the Sessions.

Cost of Gas and Electricity in Paddington.—From a report issued by the Paddington Board of Guardians, it appears that the total expenditure on lighting last year was £1356, divided as follows: Gas, £802; electric light, £554. In the preceding year, the figures were: Gas, £805; electric light, £507. The other figures since the electric light was introduced (1898-9) were as follows: Gas, £697, £754, £779, £794, £731, £819, £765, and £733; electric light, £219, £245, £431, £476, £533, £540, £515, and £471.

The Lighting of Charles Street, Whitehall.—At the meeting on Thursday of the Westminster City Council, the Works Committee reported that, the Government having abandoned their proposal to appropriate Charles Street, Whitehall, the Secretary of His Majesty's Office of Works had written stating that, in connection with the alterations in the street in consequence of the erection of new public buildings, the office proposed to provide new lamp-posts to the number of 14, the columns and lamps being of special pattern. This number of lamps is larger than would be ordinarily required for the lighting of the street; but the arrangement had been decided upon from an architectural point of view. The City Engineer (Mr. J. W. Bradley) reported having been in negotiation with the Office of Works in regard to the matter. He said that for the Council's purposes the street would be sufficiently lighted with seven incandescent gas-lamps, each lamp having a double burner, and using about 7 cubic feet of gas per hour. He suggested that the Council should pay for this number of lamps; and that the additional annual cost of gas for the remaining seven lamps, amounting to about £17 12s. 11d., should be borne by the Office of Works. This was agreed to.

MISCELLANEOUS NEWS.

THE WELSBACH COMPANY'S AFFAIRS.

A Larger Business but a Reduced Ordinary Dividend.

Meeting at Winchester House last Thursday, the shareholders of the Welsbach Company were chiefly interested in hearing from the Right Hon. Lord Weardale, the Chairman of the Board, an explanation of the reasons that the finances of the Company did not admit of a larger dividend on the ordinary shares on this occasion. To judge by the small amount of interrogation, the shareholders were not particularly concerned that the state of trade—hopefully only temporary—did not admit of a more substantial distribution this year. All commercial concerns are subject to the vicissitudes of trade; and the good and bad must be taken together.

THE FINANCIAL POSITION.

In our survey of the proceedings, we shall only touch lightly on the financial side of the business, and devote ourselves mainly to other matters of more general concern to the gas industry. In moving the adoption of the report and accounts, and the declaration of a dividend at the rate of 6 per cent. (less income-tax) on the preference shares and at the rate of 3 per cent. on the ordinary shares, less income-tax, his Lordship reminded the shareholders that, when last year he had the pleasure of first addressing them on assuming the chair, he and his colleagues had looked forward to a year of reasonable prosperity. The business was being well maintained, and they were then hopeful that, with prudence and under reasonably favourable conditions, they would be able to present this year equally satisfactory results. Their expectations had, however, not been fulfilled; and it was his duty to give an explanation of the causes which had led to what was a disappointment for them all. Generally speaking, the year had been one of extreme difficulty, and of dear money. Turning to last year's balance-sheet, it would be seen that they closed the year with £18,772 in cash, against which they had to provide right away the sum of £55,155 for dividends alone. They had to provide money for the completion of their freehold premises; and, in addition, of course, such sums as might be required, after allowing for book debts recovered, for the general working of the Company's business. To realize the Company's investments in the state in which the market then was would have represented so heavy a loss that the Board were obliged to nurse them. It was found cheaper to borrow from their bankers, even at the abnormally high rate of interest obtaining throughout the year. More recently, he was glad to say, the market for gilt-edged securities had improved; and the Directors were able to realize some of the investments at a small profit upon the book figures, and to discharge the Company's indebtedness to the bank. The shortage of money was appreciably due to the difficulty of getting in book debts—a familiar feature at all times in a dear money market. It was accentuated by the necessity they were under to acquire freehold premises of their own, suitable for carrying on this great business. And it was finally accounted for by the increase of £40,000 in stock, as compared with the year ending March 31, 1906. These three heads, which explained why they had been short of money, gave at the same time ample reason for the drop in the credit to interest account from £5000 last year to £2250 this year.

PROFITS AND COMPETITION.

The total profits for the year from all sources amounted to £70,480. This compared with £83,960 last year, and was a reduction of £13,500. The falling off in the net profits of the English business was not attributable to any shrinkage in the sales, or in the volume of trade, which had been maintained at an appreciably higher level than last year. More mantles and more burners had been sold; and the cash turnover had again increased. The sales of Kern radiators and cookers were also something like 50 per cent. up on the year. Unfortunately, however, increased business meant of necessity increased expenditure; and though the figures had been untiringly scrutinized by the Board from the point of view of economy, still no item had been struck out which would make for efficiency, or which would tend to enable the Company to give to the vast *clientèle* on their books that satisfaction which they expected, and which the Company were bound to give them, if it was desired to retain their custom in the face of fierce and (if he might use the expression) suicidal and illegitimate competition. He used the expression because he thought when they saw, as they did that day, in the Receiver's hands at least two firms who had been cutting Welsbach prices by travelling and advertising during the past season, and when a third offender had just held a meeting of its creditors, they might fairly say that, from the point of view of the shareholders of these concerns, such tactics were suicidal and illegitimate. A fourth competitor had also advertised against them to an enormous extent; and yet the Board had the best of authority for saying that that competitor did not sell even 2 million mantles—a figure absolutely trifling in comparison with their own gigantic output; a figure, moreover, which, having regard to the expense incurred, could only represent an enormous loss. On the one hand, therefore, they had had to face reduced prices for almost every article the Company sold; and, on the other hand, they had a natural and unavoidable increase in the cost of travelling and advertising—that was to say, in the propaganda which kept the business together, subject at all times to the continuance of excellence of manufacture. On this last point he could unhesitatingly say that the Company were to-day—thanks to their able Chemist and Works Manager (Dr. Schoder) turning out a more perfect mantle than they had ever done, and they were constantly recovering customers tempted away from them in past years. The Welsbach ramie mantle, whether for upright or inverted burners, and the Plaissetty cotton mantle manufactured by them under license, had no equals in the market to-day. As to royalties, the expiry of the Company's last mantle patent in January, 1907, had, of course, deprived them of an appreciable income formerly accruing from this source—an income, moreover, which they could hardly hope to replace now. The trading

account profit of £38,937 showed a reduction of £8985 as compared with last year. This reduction was not really so great as the figures indicated. Last year the trading account was helped by a contribution of some £2400 from the suspense account, while this year nothing had been taken from the account, except a trifling sum to provide for the reduction of the lease of some premises which, unfortunately, came to the Company as a legacy from the past. Regarding the balance-sheet, the big item of undertaking, property, &c., was up about £1900 in consequence of increased plant, and also owing to the fact that six further shares in the Austrian Company were purchased during the year. The freehold premises at King's Cross stood at £42,361, as against £28,011 last year—everything being now practically complete there. Debtors were £60,543, or £11,700 in the Company's favour. Creditors, on the other hand, were about £14,000 less, which was also in the Company's favour, and meant that they owed practically nothing, except the debt to the Austrian Company for fluid.

THE TREND OF THE INCANDESCENT MARKET.

The figure of stock was higher this year by some £6000. He had purposely left to the last any reference to stock because he had a good deal to say about it. He explained last year that their arrangements with regard to ramie, which had to be procured from abroad, necessitated a great increase in stock at the factory, as compared with cotton, which latter they could always procure at home at a few days' notice. He also explained their new arrangements with regard to the direct purchase of glass, and the consequent necessity for carrying their own stock of this class of goods, in which they were doing a large and increasing business. These two items alone accounted for an increase of some £20,000 over the stock of 1906. The Board, and particularly the Managing-Director (Mr. Lawrence Fletcher), recognized fully that stock was the key to the trading account of an industrial company; and no effort had been spared with the object of keeping this within the strictest possible limits, consistent with their ability to promptly execute customers' orders. They recognized also that the holding of £100,000 worth of stock in place of £60,000 worth, had hit the interest account and the insurance account very heavily. The chief difficulty they had to face, however, was the fact that the inverted system of incandescent lighting had to a large extent gained the public favour; and, in consequence, almost every article the Company sold, from the smallest mantle to the largest lamp, from the smallest burner or gas-bracket to the largest lantern or pendant, had to be duplicated in stock; and while they hoped that no further increase would be necessary in the stock figure, they did not at the moment see their way to any very material reduction, so long as the old system and the new continued to divide the public favour. With a stock of this size, he need not tell the shareholders that it was at all times necessary to consider the valuation on strictly conservative lines; and he thought the Managing-Director's advice to deal with the figure on its own merits, and leave the suspense figure out of the account this year, was sound advice. Mr. Fletcher was an optimist when selling; but he (the Chairman) was glad to say he believed him to be a pessimist when stocktaking. He was assured that the stock this year had been anxiously and carefully valued with due regard to the influence which the increased figure would necessarily exercise upon next year's trading account.

LIQUID ASSETS.

Speaking from the chair two years ago, Mr. Mattinson told the shareholders that he thought no person had intelligently looked at a balance-sheet unless he had satisfied himself as to the balance of liquid assets by taking the cash and investments, the debtors, and the stock-in-trade on the one hand, and deducting from them the creditors on the other. He did this, and showed that the liquid assets so taken amounted to £241,545—a very strong position indeed. If the same test were now applied, and allowing book value for the freehold premises, they arrived at a figure of £240,726; and if they added to this the fact that, since then, seven more Austrian shares had been purchased, he (the Chairman) thought the shareholders would appreciate that their assets had not wasted in any way.

OPERATIONS IN GERMANY.

The report mentioned that the Company had purchased the entire undertaking of a mantle manufacturing business in Germany, and that, in order to do this, they had had to realize securities allocated to the reserve fund. At the moment, it was not in the best interests of all concerned to indicate with exactitude the numerous directions in which the Board confidently hoped that advantages would result. Germany was this year, thanks to the expiry of an old agreement, for the first time open to this Company; and he thought it would prove that the Board had acted wisely in carrying the mantle war into the enemy's country. The business in question was prosperous, old-established, admirably managed, and of undoubted value. Major Pringle and Mr. Fletcher, two of the Austrian representatives, would, together with the Managing-Director of the concern in question, form the Board; and as their representatives could call in on their Vienna journeys, the work of the Board would be carried on with the minimum of expense.

THE AUSTRIAN COMPANY AND THE FLUID MARKET.

The report informed the shareholders that causes similar to those which had operated against the Company in this country had also militated against the success of the Austrian Company, and that the figure of £36,500 which represented their dividend contribution to the Welsbach accounts this year, would next year be £12,000 less. In other words, the Austrian Company had dropped practically to the same extent as themselves during the past year; and this drop was due in the main to similar causes. In addition, however, during the year, the Vienna Company lost, by the expiration of a contract, one of their largest customers for fluid, who had commenced manufacture on their own account. To make good this loss of trade, the Vienna Company had recourse to the Welsbach Company; and the Board, under arrangements beneficial to both Companies, had already succeeded in finding a market for the bulk of their product thus left available. It was hoped that the arrangements made would mean a larger trade for the Austrian Company; and the output capacity of the fluid factory was now being increased in order to be in a position to cope with this greater business should the hopes of the Board be realized. The Board of the Austrian Company had recently been fortunate in securing an extension of the agreement, on the old terms, with Mr. Moriz Gallia, the able Managing-Director in Vienna. The Board were confident that everything that was possible was being done by him, but even he could only minimize the effect of ever-increasing competition, coupled as it was at present with higher prices for raw materials, and, on the other hand, the lower prices which had ruled during the year for fluid or nitrate, which formed the principal manufacture. The Board recorded with regret that during the year the Austrian Company lost the valuable services of the Chief Chemist (Dr. Haitinger), who, after a very long period of employment with the Company, had retired to enjoy, they hoped, a well-earned leisure. Suitable arrangements had been made for the management of affairs, under Mr. Gallia, at the Atzgersdorf Factory, where Mr. Peters was now in charge. This gentleman, owing to his long service under Dr. Haitinger, was thoroughly conversant with the Company's secret processes involved in the making of the original and famous Auer lighting fluid; and the Board had confidence that he would maintain the product at its well-known standard of excellence.

AS TO THE FUTURE.

Regarding the future, the Board did not take a gloomy view. They might, of course, be wrong; but they did not think they were. The Board would be disappointed of what they deemed their prudent expectation if this time next year they had to show a result any less favourable than that of the past year's working. In every instance, their contracts with customers were up; and, generally speaking, their prospects were encouraging. There were signs (to which he had alluded) that their competitors were weakening; and it was probable that only one thing could materially interfere with the Board's calculations, and that was the cost of raw material. So far as the Austrian Company were concerned, the Directors believed that, including their own existing contracts, they and their new allies would be able to offer them all the orders they could execute. So far as they and their new friends were concerned, the contracts indicated that they would be able to equal last year's sales. In conclusion, his Lordship gave expression to commendation in favour of the staff, and particularly of the Managing-Director (Mr. Fletcher), whose energy and zeal, he said, never flagged. He brought great abilities and certainly most devoted service to the discharge of his very difficult duties.

There was a short discussion, partly commendatory, and partly interrogatory, to which the Chairman gave satisfactory replies. The resolution was passed; and other formal business was transacted. After which the Chairman, Directors, and staff were cordially thanked for their services.

HALIFAX GAS COMMITTEE AT LIVERPOOL.

Inspecting the Yellow Prussiate Plant.

Last Wednesday week, members of the Halifax Gas Committee—accompanied by the Mayor (Alderman W. Wallace) and the Gas Manager (Mr. John Wilkinson)—visited Liverpool, to inspect the Davis-Neill yellow prussiate plant in operation at the Linacre Gas-Works. The erection of a prussiate plant at Halifax is under the consideration of the Committee; and the Chairman (Mr. J. Collinson, J.P.) and Vice-Chairman (Mr. I. H. Skinner) were anxious that the members should have first-hand information to guide them. Having regard to the criticism which has been passed on town council deputations, Mr. Collinson and Mr. Skinner determined to take the expense on their own shoulders.

On arrival at the Linacre works, the party were, in the absence of the Engineer (Mr. E. Allen), received by the Works Manager (Mr. J. M'Ewen), who gave them a cordial welcome, and, besides showing and explaining the prussiate plant, readily offered any information desired. In replying to questions put to him, Mr. M'Ewen warned the Committee against installing too large a plant. What was wanted, he said, was plant to deal with the minimum quantity of coal carbonized. It was better to have some raw material running to waste during the period of maximum output than to have the plant largely idle during the greater part of the summer. Capital outlay was thus saved, depreciation was avoided, and there were no unnecessary wages. As to the cost of recovering cyanogen by the prussiate process, under favourable circumstances, the full cost of material, working expenses, and everything, amounted to under £10 per ton. The Linacre works were now securing from £30 to £32 per ton for the finished product; and they had obtained as high as £36 to £37 per ton during the last two years. Of course, with an extension of manufacture, and the placing of more cyanogen on the market, it was reasonable to expect that the price would go down. But as against the extension of manufacture, he anticipated a growing demand for the product, in view of the development of gold mining in South Africa and elsewhere. The yield of the finished product at the Linacre works was about 3 lbs. per ton of coal carbonized. Of that, however, about one-third was lost in re-distillation and crystallizing. They had had the plant in use at Linacre about three years; and they had found the working to be exceedingly simple, while the wear and tear, too, had been slight. It cost approximately £3000, dealt with the product of 300 tons of coal per day, and was run by three shifts of three men each. With a maintenance of the present market price of the finished product, the Halifax Corporation, he thought, ought to be able to pay for a prussiate plant of suitable size for their works out of the profits of four or five years' working. The risk, therefore, was a good commercial one to take.

Before leaving the works, the visitors cordially thanked Mr. M'Ewen for the information he had given them.

PRICE OF GAS AT DARWEN.

At the Monthly Meeting of the Darwen Town Council on Monday of last week, Councillor Thos. Duxbury moved—"That as and from the 1st day of October next the price of gas be reduced from 2s. 9d. to 2s. 5d. per 1000 cubic feet for ordinary consumers and street lighting, and that a corresponding reduction be made to slot-meter consumers."

In introducing his motion, Mr. Duxbury pointed out that ever since he became a member of the Council he had been endeavouring to convince the members and the public of the iniquity and injustice of compelling the consumers to pay more than they ought for gas, in order to relieve ratepayers who were not consumers of their rates. He believed a large majority of the councillors were convinced that he was right; but still year by year they kept voting the money wrongfully because some other Committee had "overrun the constable," and they thought this was the easiest way of raising the money. Though the Council's income was increasing every year, by reason of increased assessments and new property, the spending went on in greater proportion. Then the pollution of the air by the smoke from houses was far greater, and did more harm, than the smoke from mill chimneys, even in manufacturing towns. All this would be obviated if gas was sold sufficiently cheap to ensure its universal use for heating, cooking, and motive power. The anomaly of the transfer this year of £2000 from gas profits to the losses of the Electricity Department had probably never been beaten in any other town. They established an electricity works to compete with their own gas-works, which tried to take away all the best consumers, and they sold electricity at less than cost price in order to get hold of them. Then when the electricity losses had been incurred, they made gas consumers pay what the electric light consumers ought to have paid. It was costing £700 a year more for lighting the centre of the town by electricity than it would cost to do it by gas, which would be more efficient. They all agreed that it would be cheaper and a better light; but they said: "Wait till the Electricity Department can pay its way without street lighting." Every light-using department of the town had had electricity installed; and the gas consumers were made to contribute towards the cost. In 1903, the price of gas was raised 3d. per 1000 cubic feet; and though there was a loss on the gas-works, the Council transferred £1000 from "gas profits" which had not been made, but which it was expected would be made by raising the price. Since then the price had not been reduced. The amount transferred from gas profits to other purposes was over £21,000; and if this had been used to reduce the capital of the Gas Department, the charges for interest and sinking fund would have been £1280 less per annum. This, added to the present profit of £4855, would have allowed a reduction of 7d. off the price, and would have enabled them to sell gas at 2s. 2d. per 1000 cubic feet, and thus encourage all the consumers to use it for fires, cookers, &c. A reduction of 4d. would absorb about £3431; and this would still leave a profit of £1424 to meet any increase in the price of coal—if it should be necessary. Next year he would hope to see another reduction of 2d. per 1000 cubic feet. There was neither sense nor reason in making gas consumers pay other people's rates besides paying their own. The gas-works paid £2523 in rates during last year, so that each consumer had already paid 3d. per 1000 cubic feet to the rates. A cottage consumer burning about 10,000 cubic feet annually, paid from 2s. 6d. to 4s. a year towards the rates of the great trading concerns and others who did not use gas, and towards his landlord's rates. He believed that if a Gas Consumers' Protection Association were formed, it would do good work. If the ratepayers had lent the capital to the gas-works, then they would expect to be paid interest; but they had not done so. The Gas Department borrowed the money; and consumers paid both interest and sinking fund. The consumers had already made over £300,000 profit, besides paying all the cost of gas making and distribution, since the works were purchased.

The motion was seconded by Mr. Duckworth, who, however, said he was afraid they might be travelling too far in reducing the price 4d. at a time. Had the proposal been to take off 2d., he would have been more pleased.

Alderman Cocker remarked that he was instructed by the Chairman of the Gas Committee to oppose the resolution entirely; and he thought the best thing to do was to refer it back to the Committee. They would have it much better discussed in committee. He moved as an amendment that the matter be referred back. Mr. Duxbury, he said, wished the Council to come lower in their price than the average of 120 corporations.

The amendment having been formally seconded by Mr. A. Gibson, it was supported by Alderman Eccles, who said that such a drastic resolution ought to go before the Committee. They were forced to go in for making electricity, to prevent outsiders entering the field.

Alderman Tomlinson also supported the amendment, and pointed out that they once had something like four different charges for the gas produced. The large consumers—the mills—had the lowest price; and the cottager paid the highest. He was glad to remember he had something to do with getting this altered. No member could say definitely what price they were going to purchase coal at this or next year. Mr. Duxbury's contention that the gas consumers borrowed money for the works was incorrect. Any money needed would be borrowed on the security of the rates; and such money was borrowed at lower interest when there was such security. Private companies had to secure loans at a bigger rate of interest than corporations. If next year they could reduce the price of gas, no one would be more pleased than himself and the other members of the Council. The question should go back to the Gas Committee, of which Mr. Duxbury was a member.

In replying on the discussion, Mr. Duxbury said he did not object to the electric light; but it should pay its own way. What he wanted was that the profits of the gas-works should not go to other departments. Some towns were prevented by Act of Parliament from using gas profits for purposes outside the undertaking.

The amendment referring the matter back was carried; fifteen voting for it, and five against.

LEEDS CORPORATION GAS SUPPLY.

Satisfactory Year's Working.

At a recent Meeting of the Gas Committee of the Leeds Corporation, a financial statement in regard to the working of the gas undertaking during the year ended the 31st of March was presented by the City Treasurer (Mr. William Derry), who stated that the gross profit realized was £103,252. From this had to be deducted £54,142 for interest charges and income-tax, leaving a net profit of £49,110. Redemption fund charges amounted to £34,402; leaving a surplus profit available for the relief of rates of £14,708. The estimated profit on the year was £14,000. Last year the estimated profit was £15,000; the actual profit, £15,273. The result was considered highly satisfactory by the Committee, in view of the greatly increased price of coal and the very low returns obtained for tar and other residuals. The Corporation, however, were not so badly hit by the increase in the price of coal as several other bodies; for, by the foresight of the Gas Committee, they had bought coal fairly well ahead at the beginning of the year. The contracts expired in September last, and even after that there were large quantities of arrears to come in. During the closing period of the year, the Committee had to buy 100,000 tons of coal at a price showing an advance of 2s. 2½d. per ton on the old figure. Had not the large contracts been entered into, however, this amount would have had to be doubled; so that the wisdom of the Gas Committee saved the city a vast sum of money. When coal was at the very lowest price, an eighteen months' supply was purchased, instead of a twelve months' supply, as had hitherto been the case. The charge for gas in Leeds at present is 2s. 2d. per 1000 cubic feet; the price having been raised by 1d. in January last. In the first three months of the financial year, however, the price was 2d. per 1000 cubic feet less than in the corresponding period of the previous year. The Chairman of the Committee (Mr. G. Ratcliffe) complimented the Engineer and General Manager (Mr. R. H. Townsley) on the results achieved; for though the average price charged for gas in the past year was 2s. 0·8d. per 1000 cubic feet, compared with 2s. 1 05d. in 1906-7, the estimated profit had been exceeded by £708.

WEST BROMWICH GAS UNDERTAKING.

The Past Year's Working.

At the Meeting of the West Bromwich Town Council last Wednesday, the Chairman of the Gas Committee (Mr. J. E. Wilson) made special reference to the annual report on the working of the gas undertaking, the principal features of which were noticed in the "JOURNAL" last week (p. 584). He said the Committee were desirous, if they could have seen their way clear, to reduce the price of gas; but circumstances were against them. They did not know what was to be done with the coal miners' eight hours question; but if it was settled by the House of Commons in favour of the men, he was afraid it would mean an increase in the price of coal. If this took place, there would be no probability of a reduction in the price of gas for some time to come. The net profits of the undertaking were £4114; and the Council no doubt wanted some explanation as to why the Committee had not made so much in the past as in the preceding year. They found that coal, oil, and other things had cost £1170 more; firing had cost them £232 more, and purifying £350 more—the latter increase being due to the impurities in the coal. There was another large item of increase—£532 for maintenance of works; but during the year they had installed a modern oil-gas plant, at a cost of between £300 and £400, which accounted for it. As this amount came out of revenue, it had reduced their profits; and the increased cost for the year totalled £3451. On the other side of the account, however, they had realized £1202 more for gas sold to private consumers, and £159 more for that used for public lighting. Coke and breeze had yielded £517 more; and tar and ammoniacal liquor about £100 more. When the £2724 was paid into the extensions suspense account, as recommended, it reduced it to £7500; so that it was now within manageable compass. If they had not a short time ago had the mining difficulties at the works, which cost them £5000, and had not made a grant for public offices, this balance would have been wiped off straight away. The gas undertaking was in as sound a position as it was possible for any concern to be. In conclusion, he referred to the excellent services rendered to the Committee by the Engineer and Manager (Mr. Harold E. Copp). The report was considered to be so satisfactory that it was adopted without discussion.

Sale of Stocks and Shares.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Messrs. A. & W. Richards conducted a successful sale, which included two new issues of gas and water capital by order of Directors. The first lots consisted of some £10 new ordinary 5 per cent. maximum shares in the Southend Water Company; the dividend paid on similar shares being at the rate of 4½ per cent. They were all sold at £10 to £10 5s. each. The other new issue was some consolidated stock of the Uxbridge Gas Company, carrying 5 per cent. dividend from the 1st prox.; and it was disposed of at par. The other items in the particulars were the following: Fully-paid £10 "B" shares in the Dartford Gas Company, carrying 7 per cent. dividend, fetched £14 each; some 7 per cent. "B" shares, of the same nominal value, in the Grays and Tilbury Gas Company, carrying £5 12s. per cent., were sold at £10 5s. to £10 7s. 6d. apiece; consolidated stock of the Lea Bridge District Gas Company, carrying 6 per cent. dividend, fetched £121 to £122 10s. per £100; a £10 original 10 per cent. share in the West Kent Gas Company was sold for £20 15s., and some additional 7 per cent. shares (£5 paid) were placed at £7 15s. to £8 each; consolidated 5 per cent. stock of the Gravesend and Milton Gas Company fetched £103 per £100, *cum div.* as from Christmas last; and a few £10 shares in the South African Lighting Association, Limited, were sold at from £14 15s. to £14 17s. 6d. each, with the dividend, at the rate of 10 per cent. per annum, accruing from the 1st of January.

A GOOD YEAR AT ST. HELENS.

At the Monthly Meeting of the St. Helens Town Council last Wednesday, the Chairman of the Gas Committee (Mr. James Crooks, J.P.) stated that the gas undertaking had had another splendid year. The incandescent lamps had been increased by 84 to 720; and there was now a total of 2014 street-lamps. The quantity of gas made was 460,864,300 cubic feet, an increase of over 33,000,000 feet; and the quality was equal to 18 standard candles. The number of consumers was now 15,647; 976 new meters having been fixed during the year. They had in free use in the town 13,438 stoves. Of the amount of £48,552 for gas sold, £20,281 was received from coin-meters, which meant that the collectors brought in 43 tons of copper coins. Bye-products had realized £20,048. Wages to the extent of £15,381 had been paid by the department during the year. The net profit was £9500, of which £5000 had been voted to the borough fund; and this sum brought the total devoted by the Gas Committee to the relief of the rates to the large amount of £81,030. The entire expenditure on the gas-works capital account had been £330,585, of which £186,671 had been repaid. During nine months of the past year, the Committee had been paying considerably higher prices for coal, lime, &c.; but owing to the successful working of all the processes for the manufacture and sale of bye-products (the latest addition to the income from these sources being from the cyanide-recovery process), a better profit than was anticipated had resulted.

Mr. Rudd drew attention to the fact that 35 cubic feet of gas were supplied for 1d. in the slot-meters; and he suggested that the Committee should reconsider the matter, and grant these consumers an increased amount of gas. Mr. Collins also thought the Committee should see if they could not do something in this direction. Sir Christopher Gamble, however, hoped they would not. He said that already they charged a lower price for gas supplied through slot-meters than any town in the country except Widnes. Mr. Crooks replied that the matter had been considered, and they found the extra cost for collecting the coins showed a deficiency of £233. There was no cause to grumble by either class of consumers, for they charged nothing for meters and no rent for stoves.

The minutes were passed.

WIGAN CORPORATION GAS SUPPLY.

The Past Year's Working.

The abstract of the accounts of the gas undertaking of the Wigan Corporation for the year ending the 31st of March shows that the revenue from the sale of gas was £61,557; from residual products, £19 976; and from fittings, cooking-stove hire, &c., £1965—making a total of £83 498, compared with £75,065 for the preceding year. The expenditure on manufacture was £32,804 (coals costing £24,181 against £19,231); on distribution, £1789; and on management, £1085—miscellaneous items making up a total of £56,068, against £48,359. The amount carried to the profit and loss account is £27,430, compared with £26,666 this time last year. The balance on this account brought forward was £4414; so that there was a total of £31,844, which has been disposed of as follows: Interest, sinking fund, &c., £17,919; public lighting, £5378; transferred to general district fund, £4000; balance carried forward, £4547.

The report of the Gas Engineer (Mr. Joseph Timmins, M.Inst.C.E.) for the above-named period shows that the quantity of coal and cannel carbonized was 42,610 tons 14 cwt., or 3174 tons 4 cwt. more than in the preceding year—an increase equal to 9·41 per cent.; and the make of gas was 487,476,000 cubic feet, or 8·49 per cent. more than before. The consumption through prepayment meters was 61,469,100 cubic feet, compared with 48,461,500 cubic feet in the year 1906-7; being an increase of 13,007,600 cubic feet, or equal to 26·84 per cent. In connection with the consumption of gas through these meters, Mr. Timmins says the increase is well maintained, as evidenced by the fact that in the year 2,048,970 pennies were collected from the respective coin-box attachments, against 1,612,351 pennies during the preceding year; representing £8536 19s. 2d. and £6718 2s. 7d., or 18 tons 5 cwt. 3 qrs. 15 lbs. and 14 tons 7 cwt. 3 qrs. 19 lbs. respectively. The opportunities offered by the coin-box attachments still continue to be made use of for depositing surplus cash. This practice is much on the increase; and though consumers have been warned against the practice, the warning is of no avail. During the year a large number of coins other than pennies—such as threepenny and sixpenny pieces, shillings, florins, half-crowns, half-sovereigns, and sovereigns—were deposited in the respective boxes; and even children are utilizing them for depositing half-pence. Ten boxes were broken open during the year; but the loss was trifling, as in nearly every case the money was recovered from the consumers, who were held strictly to their agreements.

Referring to the financial position of the undertaking, Mr. Timmins points out that the average annual profits for the past 23 years have been £23,305 gross, or equal to 7·17 per cent. on the capital invested, and £9365 net, including the value of the gas supplied free for the public lighting. For the past year this amounted, as already shown, to £5378; making the net profits £9925. Last year the cost of coal and cannel carbonized was at the rate of 11s. 4¼d. per ton; the revenue from residuals being 9s. 4½d. per ton. The average cost for the period from 1887 to 1908 is 10s. 4¾d. per ton, and the revenue 7s. 7¾d.

The following figures are from the comparative analysis of the working results for the past two years: For 1906-7, the total expenditure on manufacture was £27,898; for rent, rates, and taxes, £7398; on distribution, £1750; on management, £1022; and on sundries, £18,624—being at the rate of 15·867d., 0·995d., 4·207d., 0·581d., and 10·592d. per 1000 cubic feet of gas sold. In the past financial year, the figures were: Manufacture, £32,708; distribution, £1789; rents, rates, and taxes, £7632; management, £1084; and sundries, £20,698—being at the rate of 17·292d., 0·946d., 4·034d., 0·573d., and 10·943d. respectively.

The following are some figures from the comparative analysis of working results for the past and the preceding year tabulated in the report:—

	Year 1906-7.	Year 1907-8.
Coal and cannel carbonized	39,436 t. 12 c.	42,610 t. 14 c.
Gas made	449,331,000 c. ft.	487,476,000 c. ft.
Do., per ton of coal	11,393 ,,	11,440 ,,
Gas sold and increased stocks	421,984,200 ,,	448,977,800* ,,
Gas sold to private consumers	367,816,100 ,,	398,739,500 ,,
Coke and breeze made per ton of coal	15·23 cwt.	15·50 cwt.
Tar, do.	13·24 galls.	12·37 galls.
Ammoniacal liquor, do.	34·77 ,,	34·92 ,,
Sulphate of ammonia, do.	27·32 lbs.	25·76 lbs.

* Including 47,452,100 cubic feet supplied free within the borough.

The capital invested in the works at the close of the year 1906-7 was £373,612 9s. 8d.—being at the rate of £9 9s. 6d. per ton of coal carbonized and 17s. 8d. per 1000 cubic feet of gas sold; while on March 31 last the figures were £382,851 18s. 5d., £8 19s. 8d., and 16s. 4d.

NEWBURY CORPORATION GAS SUPPLY.

The Past Year's Working.

At the recent Quarterly Meeting of the Newbury Town Council, the accounts of the Gas Department for the year ending the 31st of March, prepared by Messrs. Wood, Drew, and Co., which had been presented to the Gas Committee, were before the Council. The following is an epitome of them:—

Income	£12,675
Expenditure	9,184
Gross profit	£3,491
Less sinking fund instalments, interest, &c.	2,106
Surplus	£1,385
Expended on an enlargement of a main, stoves, and £500 reserved for purifier renewals	1,187
	£198

The quantity of coal carbonized during the year amounted to 5857 tons, and the gas manufactured was 63,188,000 cubic feet, of which 908,200 cubic feet were used on the works and 60,668,000 cubic feet were sold, accounting for 61,576,000 cubic feet, and leaving 1,611,800 cubic feet unaccounted for; being a decrease of close upon a million feet. The increase in the output during the year was 2,531,000 cubic feet. The 5857 tons of coal cost, on an average, 18s. 10½d. per ton, against a consumption in 1906-7 of 5524 tons at an average cost of 18s. The gas made per ton was 10,788 cubic feet, compared with 10,981 cubic feet in 1906-7; the gas sold, 10,340 cubic feet per ton, against 10,358 cubic feet before. The Committee recommended that the rest of the surplus of the year's working (£198) should be added to the £500 reserved for the renewal of the purifiers, and also that the salary of the Manager (Mr. W. R. Davey) be increased by £30 per annum as from the 25th of March last.

In moving the adoption of the Committee's report, Alderman Smith remarked that the balance-sheet for the past year disclosed a very satisfactory state of affairs; and he expressed the hope that the Council would agree with him in this expression of opinion. It was proposed to set aside £500 towards the new purifiers, which would cost about £1500, and were absolutely necessary. This would be a renewal of plant, and therefore it was justifiable to use a share of the profits for the purpose. They had kept down the expenses of management—the desire being to work economically, at the same time making proper provision for the requirements of the town. They got as much out of the coal as possible, and the working statement was perfectly satisfactory. As long as the Gas Department held its own, paying its interest and instalments, and meeting the requirements of the town, he thought this was all that was required of them. It was three years ago since there had been any increase in the Manager's salary; and the Committee felt that the successful results of his management justified the addition proposed. Mr. Knight, in seconding the motion, pointed out the progressive nature of the sales of gas—viz., 53 million cubic feet in 1906, 57 millions in 1907, and 60 millions in 1908. He supported the addition to the Manager's salary because in Mr. Davey they had a man who devoted his best energies to the promotion of the undertaking. Mr. Harris remarked that the Committee suggested the increase because the Manager had been instrumental in producing the excellent report before them. Mr. Turner said he could not, on public grounds, feel satisfied that a sufficient case had been made out for the Committee's proposal. Mr. Edwards heartily supported the increase of salary, as he believed that Mr. Davey most conscientiously discharged his duties. Economy was not always obtained by paying the lowest price, but was best judged by results; and it was best for them that the gas undertaking should be in the hands of a manager who would devote his time, energy, and ability to it in the manner evidenced by the balance-sheet now presented. The Mayor (Mr. J. Stradling) said he should like to associate himself with the remarks as to the excellence of the report. He had been somewhat of a critic from the time he became a member of the Council, and he was glad to acknowledge that, considering the stress of circumstances, the competition, and the increased amounts paid for coal and labour, it was a very satisfactory state of affairs, and one of which the town had every reason to be proud. Alderman Lucas, as one of the oldest members of the Gas Committee, said this year's statement was one of the best that had ever been presented. Alderman Smith, having replied to the discussion, said that in conversation with the Auditor he had told him that if they wished to sell the undertaking he could get a customer for it within a week for £70,000. The report was adopted.

COVENTRY CORPORATION GAS SUPPLY.

Considerable gratification was expressed at the last meeting of the Coventry Town Council that the past year's working of the gas undertaking, some figures in regard to which have been given (see *ante*, p. 585), had proved so satisfactory; the net profits amounting to £9953. Mr. W. H. Batchelor, the Chairman of the Gas Committee, in moving the adoption of their report, confessed that the result was a pleasant surprise. A year ago he prophesied that it would not be a particularly favourable time for the undertaking; but he was glad he had proved a false prophet. The successful year enjoyed by the concern might be attributed to three causes—the increase in the average selling price of gas (one-third of a penny being the amount), the increased consumption, and the reduction in the cost of repairs and maintenance. The management deserved the congratulations of the Council and the citizens on so commendable an achievement as that disclosed in the accounts. More gas had been sold than the previous year; more coal has been carbonized; and the popularity of the prepayment system was demonstrated by the increased revenue under this head. The large increase in the price of coal in the past twelve months did not affect them quite so much as it was likely to do this year, since most of their contracts were made when the advance took place. The Committee were of opinion that the reserve fund should be increased from £10,000 to £15,000. They recommended that £3000 of the surplus should be voted to the district fund in relief of the rates, that £6000 should be set aside to meet the loss of capital consequent on the abandonment of plant at the old works, and that the balance should be carried forward. Mr. Colledge seconded the motion without comment. A short discussion followed. Alderman Andrews spoke against the policy of the Committee in allowing large consumers to have gas at really less than it cost, and making the small consumers pay the difference, seeing that the latter represented so large a proportion of the total. Mr. W. H. Grant voiced complaints received as to the variation in discounts to slot-meter users. Mr. Batchelor, replying to these criticisms, said the large earnings of the Gas Department showed that the Committee's policy was a correct one and thoroughly sound. As to the variation in the discounts, the mechanism of the meters was liable to go wrong; but in all such cases prompt measures were taken to adjust it, and there was really nothing to complain of. The accounts were passed, and the Committee's recommendations as to the disposal of the profits were confirmed.

A SUCCESSFUL YEAR AT FENTON.

At the last Monthly Meeting of the Fenton Urban District Council, a lengthy statement was made with regard to the past year's working of the gas undertaking.

In moving the adoption of the Gas Committee's report, Mr. Shenton, the Chairman, said he was not always able to bring forward a statement which would be so universally acceptable, not only to the Council, but to everyone concerned. As most of them were aware, during late years a great deal of controversy had ranged round the policy that had been pursued at the gas-works. But whatever controversy there had been, all would agree that the results had been entirely satisfactory, and that they had provided a sound undertaking for the ratepayers. Notwithstanding the reduction that had been made in the price of gas the result had been a reasonable profit upon the year's working. He mentioned this in consequence of the statement made by the Town Clerk of Stoke that a certain reduction had been made in the price of gas in order to influence the result of an inquiry that was then taking place. This statement was not only unfair, but it certainly had not been justified by results. Two years ago, the statement was made that a further reduction in the price of gas would occur before the end of that financial year. This reduction duly took place. The income last year was £13,961. From consumers of gas had been received £9561, which was a decrease of £669—owing entirely to the reduction in the price. They had a slight increase from stoves of £19; and from residuals they had an increase of £537—the sum realized being £3690. It had cost something like 3d. per 1000 cubic feet more for coal than for the year 1907. There had been a decrease in repairs and maintenance of works of something like £900. The expenditure on the year's working had been £10,436, and the gross profit was £3524. After allowing for interest and repayment of loans, £2953, there was a net profit of £603. This, together with the value of the gas that had been given for public lighting, amounted to £1948, which was, he thought, eminently satisfactory. With regard to the £603 profit, they had no use whatever for it at the gas-works. They had done everything that would be required for some years to come, and had plant which was capable of producing something like 50 per cent. more gas than there was now any demand for. Therefore, they could do nothing with the profit but turn it over to the Chairman of the Finance Committee for his own purposes. There had been somewhat a change of policy during the last few months. They had very large balances in connection with every department; and with an abounding and increasing revenue at the gas-works, they would not have been justified in any longer charging the gas consumers with the amount for public lighting until the whole of the balances in the bank were exhausted. Until these balances were exhausted, they would be doing the gas consumers a great injustice in continuing to take money out of their pockets; and he decided to ask the Gas Committee to consider whether it would not be wise to charge the common fund with the lighting of the town meantime. The Committee had every reason to be satisfied with the results of the past year's working. They had in the gas-works a sound asset and a most valuable undertaking, and an efficient staff of workpeople and officials. The results had not been obtained by any system of squeezing, for everyone had been considered. He believed it was perfectly true to say that during the past year there was not a single workman employed on the works who had not received some addition to his wages.

In seconding the motion, Mr. Goddard said he was glad the policy had been adopted of charging the district fund with the cost of gas used for public lighting. It was in his opinion the right policy; and he did not think anyone would suffer in consequence. The profit made last year was exceedingly good, and it showed that the works had been very well managed.

The Chairman (Mr. P. Elliott) remarked that he could not say he ever agreed with lighting the town free; and he did not think the gas-works were called upon to do so. The alteration of policy was decided upon before the order came from the Local Government Board. In the case of works supplying a commodity that really was a monopoly in the town, there was no justification at all that it should take upon itself to light the town free of cost, or to do other than distribute profits which were reasonable. He congratulated the Chairman and the Committee and all concerned on such a satisfactory report.

The motion to confirm the minutes was then carried.

LANCASTER CORPORATION GAS UNDERTAKING.

Annual Report of the Gas Engineer.

The Gas Engineer and Manager of the Lancaster Corporation (Mr. Charles Armitage, Assoc.M.Inst.C.E.) has issued his report for the year ending the 25th of March last. He states that the total receipts, including bank interest, less commission, were £30,557; and the expenditure was £20,623—leaving a gross profit of £9934. This has been disposed of as follows: Interest on stock and mortgages, £3576; redemption fund, £1779; income-tax, £630; borough fund, £2500; and reserve fund, £1449. The reserve fund now amounts to £11,012; and £1778 was added to the redemption fund during the past year, making it, with interest accrued, £31,759. Nothing was added to the capital account during the past year; but £1432, the cost of new mains, services, meters, and prepayment stoves, was charged direct to the revenue account. The receipts for gas amounted to £15,194—an increase of £464. There were 2877 prepayment meters fixed at the date of the report; and the receipts for the past year amounted to £4628. The net receipts for public and private lamps were £107 2s. 11d.; 16,583,213 cubic feet of gas were supplied to the public lamps free of charge, equal to the sum (at 2s. per 1000 cubic feet net) of £1658 6s. 5d. The average price received per 1000 cubic feet of gas sold was 1s. 11·71d. This sum was absorbed as follows: Net cost of gas, 11d.; new mains, services, meters, and prepayment stoves, 1·7d.; interest on stock and mortgages, less interest from banking company, 4·19d.; redemption fund, 2·12d.; to borough fund, 2·98d.; and reserve fund, 1·72d. The average cost of coal was 12s. 4·98d. per ton, against 11s. 0·52d. in the preceding year. Coke contributed in return 6s. 1·25d., and products from tar and ammoniacal liquor 3s. 6·53d.; making a return for residual products of 9s. 7·78d. per ton of coal carbonized, or 77·71 per cent. on the cost of coal. Products, except pitch, have fairly maintained their prices since the last report, and have a steady tendency at present.

The working statement accompanying the report shows that the total quantity of gas sold and used at the works and offices during the past twelve months was 203,822,063 cubic feet—an increase of 8,361,611 cubic feet (4·27 per cent.). The works and mains were maintained in an efficient condition. The stoking machinery, including the coke-conveyor, are stated to be working very satisfactorily. These installations, together with the alterations to furnaces, have further reduced the cost of fuel and wages. Mr. Armitage says an extension to the carbonizing plant will be required in the near future, to be ready for work in the winter of 1909.

COOKER RENT QUESTION AT LINCOLN.

The Year's Working.

At the Monthly Meeting of the Lincoln City Council, when moving the adoption of a resolution by the Gas Committee that no rent be charged for gas-cookers from Oct. 1 to March 31 next, Alderman Wallis, the Chairman of the Committee, alluded to the finances of the department for the past year. He said a little more gas had been made than in the previous year. Coal cost £3300 more; but sums had been saved on other items towards this extra amount. There was a saving of £738 from the new stoking apparatus. This was very satisfactory. The apparatus was only in operation part of last year; and there was no doubt that with a full year's work a saving of £1000 would be effected. As to coke, they had had a very good sale for it, and higher prices were realized than had been calculated upon at the beginning of the year. Their total liabilities were £156,244; and they had on the assets side £249,813. There was thus a balance in favour of the Committee of £93,569. Regarding the question of the cooker-rents, the Mayor and others had inquired when the Committee were going to consider the matter. The Committee now thought that they might relieve those who hired cookers of part of the rent, as the price of coal would be less per ton than it was last year, and they saw no reason why they should not make as much out of coke. The result of the year's working was a profit of £3564, against £3977 the previous year, or a difference of £413. The Committee had recommended a grant of £3500 from the profits; and the Council had accepted it. The Committee received more inquiries for cookers; and as the weather was now warm, it was the time when cookers were sought. They, therefore, had decided not to charge rent for cookers between Oct. 1 and March 31. It would be a loss in one way of something like £500; but it would not be such a loss as appeared at first, because if the Committee did not charge for the cookers during the winter months a large number of citizens would hire them for the summer, and would very likely keep them through the winter, and cook with them. The Committee would thereby be saved the expense of fetching cookers away from houses in winter, and returning them in the summer.

Mr. Bell said it was a very pleasing fact that they had received

£3500 from the Gas Committee in the face of the increase in the price of coal, and in spite of the fact that the Council decided not to raise the price of gas. The past year's working proved the wisdom of the Council in deciding not to increase the price. The proposed method of reducing the charges for gas-cookers was a step towards the abolition of cooker-rents altogether. He looked to the future to see cookers supplied free, the same as meters. Alderman Wyatt was a little disappointed at the action of the Committee, as he had been under the impression that they would abolish the charges altogether. However, when March came he did not think the Chairman of the Committee would have the courage to recommend that the rents for cookers be again charged. He thought it was going to be the death-blow to the charges; and he considered it a wise financial policy to abolish the rents. The Mayor (Mr. J. Mills) congratulated the Chairman of the Committee upon the excellent year's working, and said it reflected great credit upon him and the members of the Committee, and also on the Manager (Mr. John Carter). He was pleased to see the Committee had taken action with regard to the cooker-rents.

The minutes of the Committee were confirmed.

ULVERSTON GAS AND WATER SUPPLY.

Engineer's Annual Report.

The Gas and Water Engineer of the Ulverston Urban District Council (Mr. John Swan) has lately presented his annual report. It shows that the quantity of gas manufactured in the year ending the 31st of March was 52,123,700 cubic feet, compared with 51,172,400 cubic feet in the preceding twelve months; being an increase of 951,300 cubic feet, or at the rate of 1·86 per cent. Of the total make, the quantity sold and used on the works was 50,424,600 cubic feet; leaving 1,699,100 cubic feet, or 3·26 per cent. unaccounted for, against 3·62 per cent. in 1906-7. The quantity of gas made per ton of coal carbonized was 10,448 cubic feet, and the quantity sold 10,107 cubic feet; the previous figures being 10,515 and 10,038 cubic feet respectively. It was estimated that the year's profit on the undertaking would be £1018; but the following figures show that it was exceeded:—

Receipts	£9644
Expenditure	5969
Gross profit	£3675
Annuities, interest on loans, and sinking fund	2535
	£1140

The net cost of gas per 1000 cubic feet sold was 1s. 3·05d.; the annuities, interest, &c., came to 1s. 0·37d.; and the net profit was 5·48d.—showing the average revenue from gas to have been 2s. 8·9d., compared with 2s. 10d. in 1906-7. The amount realized per ton of coal from the sale of residual products was 10s., against 8s. 8·86d. The Engineer attributes this great advance largely to the new settings of retorts, whereby only 12 per cent. of the coke produced is required for fuel, compared with 30 per cent. needed prior to their introduction; representing between 500 and 600 tons more coke for sale, compared with an estimated saving of 250 tons. The tar made was 11·9 gallons, and the sulphate 23·86 lbs. per ton of coal. There were 66 prepayment and 19 ordinary meters fixed during the year; making the total number of meters in use 2196, of which 1005 are of the prepayment class. At the end of the year there were fixed 929 cookers, 296 gas-fires, 36 gas-engines, and 10 washing-boilers.

In the Water Department, the receipts were £2695; and the expenditure (including standing charges) was £2235; showing a net profit of £460, against £452 estimated.

The whole profits from the two departments, amounting to £1600, have been carried to the reserve fund, to assist in defraying the expense of new purifying plant and other extensions about to be undertaken. Since the presentation of the report, the price of gas has been reduced another 1d. per 1000 cubic feet; making the present charge 2s. 6d., less 2½ per cent. discount.

METROPOLITAN WATER BOARD.

Improved Supply for South London—The Underground Water Question.

At the last Meeting of the Metropolitan Water Board before the Whitsuntide recess, a recommendation contained in a report of the Works and Stores Committee, that an estimated expenditure of £6700 in carrying out works necessary for the improvement of the supply in the southern district should be sanctioned, was approved. It was also agreed to incur expenditure not exceeding £1600 in carrying out works necessary for the extension of the high-pressure system in the northern portion of the Lambeth division of the southern district. The Committee likewise recommended that an expenditure not exceeding £24,500 should be authorized in respect of the provision of pumping machinery (£15,000), engine-house, &c. (£9500), at the Hadley Road well, and that tenders should be invited for the works. In the course of the discussion on this recommendation, Sir Melvill Beachcroft remarked that the knowledge of underground water, so far as the members of the Board were concerned, was very limited; and he thought the time had come, now that they were going to spend large sums of money, when they should have some definite advice before them as to the capability of the wells—as to whether wells justified expenditure, and as to what was being done in the way of well-sinking by those who were now using water for business purposes. He urged that an inquiry should be made into the whole question of underground water. Mr. H. Ward pointed out that the water level of London had sunk about a foot a year during the last 70 or 80 years. Mr. G. S. Elliott, the Chairman of the Appeal and Assessment Committee, said the matter was of importance in view of the threats to sink wells in the City of London. It would be well for those who threatened to know that the wells would only last a very few years. After further discussion, the recommendation of the Committee was adopted, and a further estimate of £28,000 in respect of pumping machinery (£16,000) and the erection of engine and boiler houses (£12,000) at the Merton Abbey well was approved. It was also agreed that, on receipt of the necessary sanction of the Local Government Board to the borrowing of the money, tenders should be invited for the works. The report of the Committee on the subject stated that during the construction of the well there

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 621.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 10	10	Alliance & Dublin 10 p.c.	19—20	..	5 0 0
268,324	10	,,	7	Do. 7 p.c.	13—14	..	5 0 0
310,000	Stk.	Jan. 16	4	Do. 4 p.c. Deb.	100—103	..	3 17 8
200,000	5	May 29	6½	Bombay, Ltd.	6—6¼*	..	5 0 0
40,000	5	,,	6½	Do. New, £4 paid	4¼—4⅜	..	5 9 6
50,810	10	Feb. 27	14	Bourne- 10 p.c.	27—28	..	5 0 0
51,810	10	,,	7	mouth Gas B 7 p.c.	16½—16⅝	..	4 3 7
53,200	10	,,	6	and Water Pref. 6 p.c.	14—15	..	4 0 0
380,000	Stk.	,,	12½	Brentford Consolidated	240—245	..	5 2 1
500,000	,,	,,	9⅜	Do. New	180—185	..	5 2 8
50,000	,,	,,	5	Do. 5 p.c. Pref.	118—123	..	4 1 4
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb.	100—105	..	3 16 2
220,000	Stk.	Mch. 12	11¼	Brighton & Hove Orig.	202—207	..	5 8 8
246,320	,,	,,	8½	Do. A. Ord. Stk.	152—157	..	5 5 1
460,000	20	Mch. 27	10	British	41½—42½	..	4 14 1
104,000	Stk.	Feb. 13	6	Bromley, Ord. 5 p.c.	116—119	..	5 0 10
165,700	,,	,,	4½	Do. do. 3½ p.c.	86—89	..	5 1 2
500,000	10	May 14	7	Buenos Ayres (New) Ltd.	10⅝—11⅛	..	6 4 5
250,000	Stk.	Dec. 13	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
150,000	20	Mch. 12	7½	Cagliari, Ltd.	24—25	..	5 16 0
100,000	10	—	—	Cape Town & Dis., Ltd.	4—6	..	—
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.	5—7	..	6 8 7
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	46—48	..	6 5 0
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	92—94	..	4 15 9
157,150	Stk.	Feb. 27	5	Chester 5 p.c. Ord.	111—113	..	4 8 6
1,493,280	Stk.	Mch. 12	5⅛	Commercial 4 p.c Stk.	104—109	..	4 15 5
560,000	,,	,,	5	Do. 3½ p.c. do.	100—105	..	4 15 3
475,000	,,	Dec. 13	3	Do. 3 p.c. Deb. Stk.	82—84	..	3 11 5
800,000	Stk.	,,	6¼	Continental Union, Ltd.	115—120	..	5 8 4
200,000	,,	,,	7	Do. 7 p.c. Pref.	140—145	..	4 16 7
460,170	Stk.	—	5⅛	Derby Con. Stk.	121—123	..	4 9 5
55,000	,,	—	4	Do. Deb. Stk.	103—105	..	3 16 2
148,995	,,	Mch. 31	5	East Hull 5 p.c. Ord.	100—103	..	4 17 1
486,090	10	Jan. 30	12	European, Ltd.	23—24	..	5 0 0
354,060	10	,,	12	Do. £7 10s. paid	16½—17½	..	5 2 10
15,182,590	Stk.	Feb. 13	4⅛	Gas- 4 p.c. Ord.	95—96	+1½	4 12 7
2,600,000	,,	,,	3⅜	light 3½ p.c. max.	87—90	..	3 17 9
3,799,733	,,	,,	4	and 4 p.c. Con. Pref.	106—109	..	3 13 5
4,193,975	,,	Dec. 13	3	Coke 3 p.c. Con. Deb.	84—86	+1	3 9 9
258,740	Stk.	Mch. 12	5	Hastings & St. L. 3½ p.c.	93—98	..	5 2 0
82,500	,,	,,	6⅜	Do. do. 5 p.c.	112—115	..	5 13 1
70,000	10	Apl. 29	11	Hongkong & China, Ltd.	18—19	..	5 15 9
4,940,000	Stk.	May 14	8	Imperial Continental	178—181	+1	4 8 4
473,600	Stk.	Feb. 13	3⅜	Do. 3½ p.c. Deb. Red.	93—95	..	3 13 8
195,242	Stk.	Mch. 12	6	Lea Bridge Ord. 5 p.c.	113—118	..	5 1 8
561,000	Stk.	Feb. 27	10	Liverpool United A	227—229	..	4 7 4
718,100	,,	,,	7	Do. B.	164—166	..	4 4 4
306,083	,,	Dec. 30	4	Do. Deb. Stk.	106—108	..	3 14 1
152,736	Stk.	Feb. 13	7⅜	Maidstone 5 p.c.	136—141	..	5 8 2
75,000	5	Nov. 28	6†	Malta & Medn., Ltd.	4¼—4⅜	..	6 6 4
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	100—102	..	4 18 0
250,000	100	,,	4⅜	Melbourne 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	May 29	3⅜	Monte Video, Ltd.	11—12*	+⅛	5 16 8
1,775,892	Stk.	Feb. 27	4⅜	Newc'tle & G'tesh'd Con.	107—108	..	4 5 8
418,460	Stk.	Dec. 30	3⅜	Do. 3½ p.c. Deb.	90—92	..	3 16 1
15,000	10	Feb. 27	10	North Middlesex 10 p.c.	20—21	..	4 15 3
55,940	10	,,	7	Do. 7 p.c.	13¾—14¾	..	4 16 7
300,000	Stk.	Apl. 29	8	Oriental, Ltd.	140—143	..	5 11 11
60,000	5	Mch. 27	7	Ottoman, Ltd.	6—6½	..	5 7 8
398,490	5	Apl. 29	7	Primitiva Ord.	5⅛—6	—⅛	5 12 0
796,980	5	Jan. 30	5	Do. 5 p.c. Pref.	4¾—5	..	5 0 0
488,900	100	June 1	4	Do. 4 p.c. Deb.	91—93*	..	4 6 0
1,000,000	10	Apl. 29	8	River Plate Ord.	12½—13½	..	5 18 6
312,650	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
250,000	10	Apl. 10	8	San Paulo, Ltd.	13½—14	..	5 14 4
125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	50—52	..	4 16 2
135,000	Stk.	Mch. 12	10	Sheffield A	245—247	..	4 1 0
209,984	,,	,,	10	Do. B	245—247	..	4 1 0
523,500	,,	,,	10	Do. C	245—247	..	4 1 0
70,000	10	May 29	10	South African	14—15*	..	6 13 4
6,429,895	Stk.	Feb. 13	5½	South Met., 4 p.c. Ord.	118—120	..	4 8 10
1,895,445	,,	Jan. 16	3	Do. 3 p.c. Deb.	84—86	+1	3 9 9
209,820	Stk	Mch. 12	8	South Shields Con. Stk.	154—156	..	5 2 7
605,000	Stk.	Feb. 27	5⅜	S'th Suburb'n Ord. 5 p.c.	116—119	..	4 9 7
60,000	,,	,,	5	Do. 5 p.c. Pref.	118—121	..	4 2 8
117,058	,,	Jan. 16	5	Do. 5 p.c. Deb. Stk.	120—125	..	4 0 0
502,310	Stk.	May 14	5	Southampton Ord.	105—110	..	4 10 11
120,000	Stk.	Feb. 27	6⅜	Tottenham A 5 p.c.	120—125	..	5 8 0
398,940	,,	,,	5⅛	and B 3½ p.c.	104—106	..	4 19 1
149,470	,,	Dec. 13	4	Edmonton 4 p.c. Deb.	99—102	..	3 18 5
182,380	10	Dec. 30	8	Tuscan, Ltd.	10¾—10¾	..	7 8 10
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	99—101	..	4 19 0
193,742	Stk.	Feb. 27	5	Tynemouth 5 p.c. max.	106—107	..	4 13 6
255,636	Stk.	Feb. 13	6⅜	Wands- B 3½ p.c.	128—133	..	4 17 9
80,075	,,	Dec. 30	3	worth and 3 p.c. Deb. Stk.	73—78	..	3 16 11
845,872	,,	Feb. 27	5⅛	Putney West Ham 5 p.c. Ord.	100—102	..	5 0 6
185,000	,,	,,	5	Do. 5 p.c. Pref.	118—120	..	4 3 4
228,300	,,	Dec. 30	4	Do. 4 p.c. Deb. Stk.	102—107	..	3 14 9

Prices marked * are "Ex div." † Next dividend will be at this rate.

was evidence that a considerable volume of water was available, as much as 1,700,000 gallons per day having been pumped for several days continuously—this being approximately the capacity of the temporary pumping machinery. The Committee understood that if permanent machinery were put down capable of lifting 2½ million gallons per day, and by continuing headings under the Board's property adjoining the well, a permanent yield of about 2½ million gallons per day would be obtained. They pointed out that the position of the well was such that it would afford a most valuable supply of water to Wimbledon, or to any portion of the southern district, inasmuch as the 42-inch main from the Hampton works to Nunhead and the four 30-inch mains from Surbiton to Brixton were all in the immediate neighbourhood of this well.

TIVERTON WATER SUPPLY.

Proposed Improvements.

An exhaustive report on the water supply of the town, and the measures which should be taken to improve it, has been prepared by the Borough Surveyor of Tiverton (Mr. J. Siddalls). The supply is derived from a leat which in the Thirteenth Century was given to the inhabitants for ever. About 25 years ago filtration works were carried out, and a reservoir was constructed. Notwithstanding these improvements, the water is not considered satisfactory, either in quantity or quality. Mr. Siddalls proposes to improve it in both respects by laying a pipe to take the place of the open leat, the construction of reservoirs, and the covering of the service reservoir for the filtered water. He says that at its source the water is practically absolutely pure, but on its way to the works it deteriorates until it contains eight times as much impurity as it had originally. When the filters are in good working order, the impurities are reduced until they are only three times the original quantity. Then the water in the present open reservoir suffers from the action of the sun's rays, and this has to be provided against, usually at a time when water is most valuable, by emptying the reservoir and cleaning it out. This is no sooner done than the process of deterioration begins again. If the deleterious influences of vegetable growth in the reservoir and of organic pollution by cattle in the meadows bordering on the leat could be removed, Tiverton would have one of the purest and least costly supplies of water in the country. This might be partially effected by fencing in the stream, though this would not prevent the vegetable growth or the pollution of tributaries. The only safe plan is to convey the water in an underground pipe all the way. Mr. Siddalls estimates that this would cost with iron pipes £4500, and with stoneware pipes £3200, or with partly iron and partly stoneware pipes £3500. The various reservoirs he suggests is one to cost £3025, another to cost from £4000 to £5000, and a covered tank to cost £450.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Waverley Association meeting which was held in the Scottish National Exhibition yesterday, in numbers and importance, eclipses all previous gatherings of the Association. The day was beautifully fine. As to the meeting, the success of it hinged upon the address of the President—Mr. T. O'Neill, of Dunbar. It was much above the average, and quite worthy of the encomiums which were paid to it by the speakers. It led, also, to a very interesting discussion, which is the main object of Presidential Addresses in the Waverley Association. This is the second of the annual meetings of the Association since the half-yearly meetings were given up; and the success of both would seem to have justified the step taken.

When the Special Committee of the Dundee Town Council upon the Reorganization of the municipal staff opened the applications for the post of City Chamberlain and Gas Treasurer on Tuesday, it was found that there were 54 applicants. The Committee went over the list, and selected five as a short leet for submission to the Council. At a meeting of the Town Council on Thursday, two other names were put forward. In the result, Mr. W. M. Burke (who is Joint Manager of the Grangemouth Branch of the Railway and Docks and Kilsyth and Bonnybridge Railway) received 17 votes, which was a clear majority of the Council; and he was elected.

In the Aberdeen Town Council on Monday, the Gas Committee recommended that authority be given to their Engineer—Mr. S. Milne—to attend the meetings of the Incorporated Institution of Gas Engineers in London, and to accompany members of the Institution to Berlin for the purpose of inspecting new gas-works in that city. A discussion arose upon the proposed visit to Germany, but upon lines altogether different from that which is usually met with in corporations. In moving adoption of the recommendations, Mr. Stewart, the Convener of the Committee, said that, as they were aware, at the gas-works just now they were at the extreme limit of their supply. The demand was so great that they were just coping with it and nothing more. They had agreed to put in plant which would tide them over their difficulties for some time; but in the very near future they must face the question of larger plant. In the meantime, the subject being discussed in engineering circles was that of retorts; and there had been some recent invention of vertical retorts, none of which had yet obtained in this country. In Germany, however, great extensions had been made in this matter, and it was desirable that the Council should know exactly which was the best retort on the market. Their Engineer must be giving his mind to this subject for the next year or two; and it was very desirable that he should know the very latest ideas on the matter. The Committee now asked the Council to send the Engineer to Germany to see into the question. Mr. G. Kemp, the former Convener of the Committee, moved that the Convener be requested to accompany the Engineer. The Engineer

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DAVIS—the Gas Stove People.

Camberwell, London, S.E.

was quite the proper man to send; but unless they were to be governed by officials pure and simple, those at the head of departments ought to make themselves intelligently acquainted with what was going on in the departments. Unless the Convener had some personal reason for not wishing to go, he would press upon him to go, because it would pay the Council in the long run to do whatever work they had to do with the latest information from one of themselves. Mr. Robertson considered that the Convener of such an important Committee ought to be in touch with all the latest improvements. Mr. Esson moved that nobody be sent to Berlin. He did so on the ground of principle, and not in any personal spirit. He strongly held that officials attended conferences for their own enlightenment and betterment. While the Town Council might give the officials the necessary time and opportunities for visiting conferences, those officials ought to pay their own expenses. After further discussion, the Council divided, when the recommendations of the Committee were adopted by 16 votes to 13.

Last week, in dealing with the subject of the Provisional Order of the Edinburgh and Leith Gas Commissioners, I brought out the kindly way in which Bailie Bryson, of Leith, spoke of the opposition of the Corporation of Edinburgh to the proposal to fix the minimum illuminating power of the gas at 14 candles. The Bailie was justified in his view that the matter could be adjusted. A conference was held on Tuesday of this week between the Lord Provost's Committee of the Town Council and representatives of the Gas Commission. The parties were not long in arriving at an agreement. The Commissioners agreed to substitute 16 for 14 candles; and with this the members of the Lord Provost's Committee expressed themselves as satisfied. With regard to testing-places, it was agreed that the Gas Commissioners should be at liberty from time to time to make use of the testing apparatus belonging to the Corporation, in the City Chambers. Tests made there, however, will only be for purposes of information; the official testing-place to continue to be at Granton. As a result of the conference, the opposition of the Corporation to the Provisional Order will now be withdrawn; and as no other opposition has been intimated, the Order will pass as an unopposed measure.

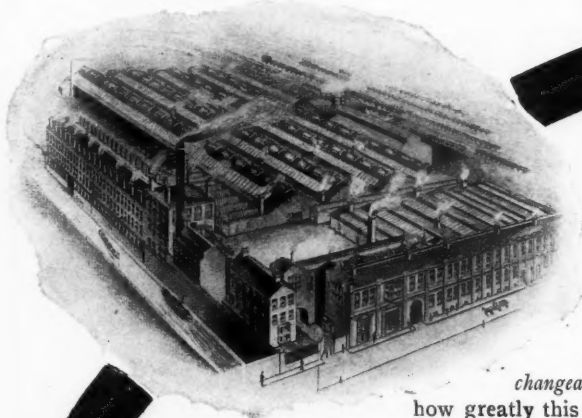
The petition by Messrs. James Milne and Son, Limited, of Edinburgh, for authority to a reduction of the capital of the Company, referred to in these Notes last week, was discussed in the Second Division of the Court of Session on Wednesday. Counsel stated that the report by Mr. Balfour-Kinnear, W.S., was to the effect that the procedure had been regular. The reasons for reduction which were given were: A fire in the premises, resulting in a loss of business; the depreciation of flat-flame burners and fittings since the introduction of incandescent gas lighting; and the great reduction in value of the price of copper. It was proposed to wipe £50,000 off the ordinary shares, which were held by the Directors; and the Directors gave up their right to arrears of dividend. The Reporter wished to bring before the Court that the valuations were made up by the Directors, in conjunction with the Auditors, and were not independent valuations, and as to the placing of the £2000 which was derived when the George Street show-room was relinquished. As to these points, Counsel submitted that, as it was only the shareholders—the Directors—who were interested, the valuations were sufficient, particularly as all the shareholders were agreeable; and that the £2000 was properly placed. It was a simple alteration, by special resolution, not of the Memorandum, but of an Article, of Association. The reduction was a pure question for the shareholders; and if they were unanimously of opinion that this was the best thing to do in order to avoid liquidation, it followed, in Counsel's opinion, the Court must hold this to be the case. The Lord Justice-Clerk said the Court were quite satisfied; and they granted the petition.

At their last meeting, it was reported to the Kirkcudbright Town Council that the revenue in the Gas Department for the year had been: For gas £1155, and for residuals £192—together, £1347; and that the expenditure had been £1217, which left a credit balance of £130. The sum collected during the year was £1432; and the arrears amount to £29. These figures were considered by the Council to be good.

The Comrie Gaslight Company have paid a dividend of 1s. per share. It was reported at the annual meeting this week of the Pitlochry Gaslight Company that there was an income last year of £1618, and an expenditure of £1102—leaving a credit balance of £516. A dividend of 5 per cent. was declared; and it was agreed to write £160 off the gas establishment, carrying forward £94. The Manager reported that the consumption of gas during the year was 5,500,000 cubic feet—an increase of 200,000 feet. The Directors afterwards met and voted a bonus of £15 to the Manager. They also agreed to provide three new purifiers, to take the place of two existing ones. The Keith Gas Company have reduced the price of gas from 6s. 3d. to 5s. 10d. per 1000 cubic feet; and no charge is to be made for the use of meters. This is the lowest price ever charged by the Company, which was instituted in 1840. The Company intimate that, to encourage the use of gas, they are prepared to instal and fit up small cookers and grillers free, and to supply large cookers at cost price, fitting them up also free.

On the afternoon of Tuesday, a fire broke out in the roof of the retort-house in the Banff Gas Company's works—caused, it is believed, by a spark from one of the furnaces. The workmen succeeded in extinguishing the fire before much damage was done.

The Water Committee of the Aberdeen Town Council on Tuesday discussed the report on the condition of the city water supply prepared by Professors Hamilton and Hay, and lodged some time ago. The Committee resolved to defer consideration of any scheme of filtration of the water until it be seen what scheme the Council may decide upon for a general supply for the city. They remitted to a Sub-Committee to consider and report as to whether a visitation should be made by the whole Council to the probable sources of supply. In view of the fact that nearly one-third of the members of the Council are not personally acquainted with those probable sources, the general opinion was that it would be advisable to make a visitation; but in order that the matter might be better considered, it was thought that the better course would be to send it to a Sub-Committee for discussion and report.



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of Gas Stove Apparatus the "Eureka" is recognized as the Standard of quality. There is no "Rule of Thumb" in the "Eureka"—every detail is scientifically proportioned—accurately adjusted—and all parts are *absolutely interchangeable*. Gas Authorities will readily appreciate how greatly this makes for economy. But there is another point scarcely less important—by simply undoing Four Vertical Tie-Rods, the New Century "Eureka" comes entirely apart.

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The Oven is Lined Inside and Out with Enamelled Steel Sheets, and packed with Patent Non-Conducting Material.
All Interior Fittings, Burners, Burner Supports, and Grill Plates, are removable for cleaning purposes and easy replacement.
As a convenience when this Stove has to be fixed in a recess, the Taps are placed in front.
Design—make—finish—alike unequalled.

JOHN WRIGHT & CO.,
ASTON, BIRMINGHAM.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia.

LIVERPOOL, *June* 5.

The tendency of the market is still in favour of buyers. Available supplies have not been large, but direct orders have been scarce, and buyers who have June contracts to cover are postponing the operation. Prices have been somewhat irregular owing to re-selling; but the closing quotations are £11 17s. 6d. per ton f.o.b. Hull, £12 to £12 1s. 3d. per ton f.o.b. Liverpool, and £12 3s. 9d. to £12 5s. per ton f.o b. Leith, for prompt delivery. The forward position is neglected, and although there has been speculative offering abroad at a discount on spot prices, it has not aroused much attention.

Nitrate of Soda.

This article is quiet in all positions, and the spot prices are 10s. and 10s. 3d. per cwt. for 95 per cent. and refined qualities respectively.

Tar Products.

LONDON, *June* 5.

Pitch is quiet. London manufacturers have been offering at 20s. without result. East coast manufacturers have accepted 18s. 6d. for small quantities for shipment during the present month; while in Manchester, manufacturers have offered for prompt delivery at 18s. without success. Creosote is unchanged in price; but there is a rather firmer tone in the market. Benzol 90 per cent. is still dull. Sales are reported at 7½d. in the North; while in London, manufacturers have offered at 8d. without finding buyers. Benzol 50-90 per cent. is dull, and there is no demand for same. Toluol also is quiet; and the usual buyers of this article appear to be well covered for the time being. Solvent naphtha is slightly firmer; several large sales which have taken place lately having made manufacturers more independent. Carbolic acid is very quiet, and Continental consumers decline to make any offers for prompt delivery. Naphthalene is unaltered; and salts are rather steadier, owing to a little more demand for ordinary creosote.

The average values during the week were: Tar, 11s. 6d. to 15s. 6d. *ex* works. Pitch, London, 20s.; east coast, 18s. 6d. to 19s.; west coast, 18s. to 19s. f.a.s. Benzol, 90 per cent., casks included, London 7¾d. to 8d., North 7½d.; 50-90 per cent., casks included, London 7¾d., North 7¼d. Toluol, casks included, London 8d., North 7½d. Crude naphtha, in bulk, London 3½d. to 3¾d., North 3¼d. to 3½d.; solvent naphtha, casks included, London 10d. to 10¼d., North 9d. to 9¼d.; heavy naphtha, casks included, London 10¼d. to 10½d., North 9¼d. to 9½d. Creosote, in bulk, London 2½d. to 2¾d., North 2⅜d. to 2½d. Heavy oils, in bulk, 2⅜d. Carbolic acid, 60 per cent., casks included, east coast 1s. 6d., west coast, 1s. 5½d. Naphthalene, £4 10s. to £8 10s.; salts, 30s. to 32s. 6d., packages included and f.o.b. Anthracene, "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article is quiet, and the market closes dull all round. The principal London Gas Companies quote £12 7s. 6d., but cannot obtain this figure; while ordinary London makes have been offered at £12 to £12 2s. 6d. In Hull, business has been done in the best makes at £12 2s. 6d. In Liverpool, the market is a little better owing to Spanish shipments, but even £12 3s. 9d. and £12 2s. 6d. has been accepted here. In Leith, manufacturers ask £12 6s. 3d.; but this price is nominal—business being impossible thereat. Buyers certainly would not exceed £12 5s. for prompt delivery at this port.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The combined coalowners of the Manchester and Wigan districts have resolved to make no change in coal prices, at any rate before the beginning of July. The demand during the past nine months from all sections of users has been so good that there has been no time for the accumulation of stocks; consequently colliery proprietors occupy an independent position, and can afford to do without making any concessions. Except for gas manufacturers, and possibly for large railway contractors, the only reductions are at the maximum rate of 6d. per ton. House coal is in less request owing to the warmer weather, but some of the middlemen are issuing fresh lists which show small reductions to householders. Engine and boiler fuels are steady; and shipping coal is in moderate request. Furnace coke is quiet. The Forest of Dean Coal Trade Wages Board have reduced the price of coal 1s. per ton and miners' wages by 5 per cent.

Northern Coal Trade.

There has been a strong demand for coals for prompt delivery; but there is some disposition to hold back forward orders, in the expectation that prices may after a while be lower. In the steam coal trade, the demand is full, but prices do not show much movement. Best Northumbrian steams are now quoted from 14s. to 14s. 3d. per ton f.o.b. Second-class steams are steady, prices varying from 12s. 9d. to 13s.; while steam smalls do not show very much change. As usual before holidays, the collieries have been working fairly well, and the output is taken up readily. In the gas coal trade, the local consumption is fair for this season of the year, and there is a good export demand; so that the production is well kept up. For Durham gas coals, the price quoted varies according to quality, from about 10s. 6d. to 11s. 6d. per ton f.o.b., and that for Wear "Specials" is from 12s. to 12s. 3d. In contracts, that for Darlington is now decided; and the average price is just about 2s. 3d. per ton below that of those that were fixed a year ago. The larger contracts for Sunderland are also practically settled, at a substantial reduction on last year's high figures; so that it is probable that

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FOR COOKING.

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he great producing companies will have bought their gas coal for the incoming financial year at considerably less than that of the cost for the period that is now nearing its close. Coke seems a little uncertain; but the lessened production of gas coke has steadied the price in some degree. For good gas coke, from 14s. 9d. to 15s. 3d. per ton f.o.b. is being quoted for the Tyne and Wear districts.

Scotch Coal Trade.

Trade has not improved, though there is a somewhat better prospect for home demand, now that the shipyard dispute has been settled and the men have resumed work. The reduction of 12½ per cent. in miners' wages, which came into force last Wednesday, will also be a help to trade. As for some weeks past, the foreign trade is the most active; and the least satisfactory is the demand for small stuff. The prices quoted are: Ell 10s. 6d. to 12s. 6d. per ton f.o.b. Glasgow, splint 10s. 9d. to 11s., and steam 10s. 3d. to 10s. 6d. The shipments for the week amounted to 301,028 tons—a decrease of 18,396 tons upon the preceding week, and of 10,076 tons upon the corresponding week of last year. For the year to date, the total shipments have been 5,426,997 tons—a decrease of 356,373 tons upon the corresponding period of 1907.

Gas-Coal Contracts.

A correspondent of the "Birmingham Daily Post" on Tuesday last wrote as follows: "The deadlock in the gas-coal market in the Midlands continues. Finding the general market steadily weakening, consumers withhold their orders; and though both sides profess to be determined, there is little doubt as to which will win. As already reported, the Associated Gas-Coal Owners have reduced their original demands by 6d. per ton; and there is a growing feeling that a further concession should be made, and business secured at once before worse times befall. The bulk of coal owners are adhering to Association terms, though it is apparent they are fighting a losing battle; and though most strenuous efforts are being made to keep the coal owners together and maintain prices, there are indications that some are disposed to consider new terms. Many of the smaller gas concerns in the Midlands, particularly in South Derbyshire and Notts, are quietly closing their business at from 9d. to 1s. per ton under last year's rates. In fact, collieries, when offered the contract for a large tonnage, show much hesitation before allowing the offer to stand over; and with a few collieries breaking away in this manner (though they may explain their action by describing the business done as being in the nature of special lots), it is not surprising that a feeling of disaffection is growing. The market has been undermined, too, by the placing of a very large Lancashire contract in South Yorkshire, at a price showing a greater reduction compared with last year than those mentioned above. Tenders have recently been invited by Manchester, and have been sent in, it is understood, at the regulation price of 6d. per ton under last year's figures. It is considered doubtful if South Yorkshire can obtain its usual proportion of this important business at any such price, owing to the easier rates ruling among Lancashire gas-coal collieries; and this will undoubtedly throw a heavier tonnage on to the Midland market. The two largest consumers in the South Midlands—Birmingham and Leicester—both of whom buy most extensively in Derbyshire and Notts, are keeping off the market for the present, with good hopes of finding such abstention profitable. The demand for gas coal has, indeed, fallen to a very low level. Much of the business, on account of the large London Gas Companies, which last year came to the Midlands has gone back again to the North; and with reduced continental requirements, and only casual purchases by home consumers, stocks are beginning to accumulate at the pits. The necessity of disposing of these is leading to sharp price-cutting for spot lots; and a still weaker tendency is probable. Contract business in consequence also has to suffer."

On the same day, the "Manchester Guardian" said: "The hopes of the Manchester Gas Committee, that they would be able to make arrangements for their next year's coal supply at reduced rates, have been realized. Yesterday the Committee had a special meeting for the consideration of tenders for the supply of coal and cannel to meet the requirements for the ensuing twelve months. To their great satisfaction, they were able to place the orders for coal at an average price of 6d. per ton less than the prices paid for the contract year that is just ending. As the contracts are for the supply of 420,000 tons, this reduction means a saving of £10,500—enough to meet the extra demand which the City Council have made upon the Gas Department to prevent an increase in the city rates."

Gas Poisoning in Salford.—A married man named Ernest Kelsey, 26 years of age, has poisoned himself by inhaling gas from a bracket in his dwelling-house. He had covered his head with a blanket during his wife's absence, and applied one end of an india-rubber tube to the gas-jet, and put the other end in his mouth. It was a penny-in-the-slot meter, and the fatality cost just that amount.

Warrington Corporation Water Department.—The Borough Treasurer of Warrington (Mr. John Fairhurst) has issued the following report with reference to the Water Department for the year ending the 31st of March last: "The gross profit amounted to £16,745, against £16,305 for the previous year. The sinking fund and interest charges, amounting to £17,792, have been paid out of this; leaving a loss of £1047, against a loss of £1299 for the previous year. The expenditure has not yet reached a normal standard, as the following items are included in the accounts: Bank interest on overdraft at bank; balance of cost of dismantling and repairing engines at Winwick and Houghton Green; extra wages and fuel at Winwick during stoppage at the Houghton Green pumping-station; and repairs to rising main. The income from water-rates, &c., again shows a gratifying increase of £839. The profit from the sale of fittings, &c., amounted to £223—a decrease of £88 upon the previous year's result. The loss has been met, as in previous years, out of accumulated profits. The capital account is overdrawn by £17,793; and the loans outstanding amount to £388,855. The sinking fund has £679 in hand; accumulated profits on revenue account amount to £2939, and the reserve fund has £3853 standing to its credit."

Richmond's "Humber" Water Heater.

For connecting to existing circulating Pipes from Coal Range Boiler. Also for Greenhouses, Conservatories, Restaurants, and Lavatory Basins.

Mr. H. J. Woodfine, Gas Manager, Wellington (Salop), writes:—

"You will be pleased to hear that the 'Humber' Boiler has been doing excellent work. From Friday, May 1st, to Friday, May 8th, the Gas consumed as shown by the Meter was 900 feet at 2s. 6d.—2s. 3d. for Seven days, or 4d. per day. Excepting on the first day, the Boiler has been used solely for providing water for Baths. Some water was used for washing-up purposes on the first day. Each morning three Baths have been taken, but on the Sunday there were five.

OUR CUSTOMER IS DELIGHTED

with the work it does, and truly it is wonderfully cheap and speaks volumes for the quick heating capabilities of the Heater on a most moderate Gas consumption. The Boiler has been used with the greatest care to ascertain exactly what it would do. The pressure is nicely regulated, and it is astonishing what can be done with the inner ring of jets on low during the night and the two rings on full for an hour before bath time."

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Projected Gas-Works Extensions at Leigh-on-Sea.

A town's meeting is to be held to-morrow at Leigh-on-Sea to consider a proposal of the Gas Committee to extend the works; a considerable amount of doubt as to the necessity for the scheme having been manifested by ratepayers. One member (Mr. Meachen), in urging that the work should be at once proceeded with, prophesied that in a few months there would be very little difference between the price of gas sold in Leigh and of that sold in Southend. During the past four years, they had been able to show a profit of £2000 on the concern. Mr. Higgins strongly opposed any further money being spent on the works. The profits they professed to have made were based on false premises. It seemed to him that if they extended the works, they must either increase the cost of gas or raise the district rate. He believed they had a valuable concern, which, in the hands of a private company, would prove remunerative. Mr. Arnold was convinced that they had a valuable asset in the gas-works; and rather than sell it to Southend, he would do his best to persuade some private gentleman to purchase it. In his opinion, it would be suicidal on the part of the ratepayers to let it go out of their hands at the present juncture. Mr. Johnson contended that had it not been for him the letter from the Southend Gas Company, offering to purchase the Leigh Gas-Works, would not have come before the Council. The Chairman (Mr. H. G. King) mentioned that the demand for gas in Leigh was increasing, and predicted that they would be sorry if they disposed of their works.

Repairs at the Barry Gas-Works.

At the meeting of the Gas and Water Committee of the Barry Urban District Council on Monday last week, the Engineer and Manager (Mr. T. E. Franklin) presented a report, in the course of which he informed the Committee that the extra large expenditure which will be necessary this year for painting, repairs, &c., will make great inroads into their revenue, and that consequently the prospect of a profit is not a very rosy one. "All necessary renewals and repairs," said Mr. Franklin, "should be carried out year by year, and should most decidedly not be allowed to accumulate until the plant is unable to be worked to advantage." He also reported that a crack had appeared in the wall at the high-level reservoir, caused apparently by a settlement of the foundations; and a slight leakage of water was taking place, but it was not serious. Mr. Watson asked why the profit would be swallowed up in repairs. Mr. Franklin replied that the Committee had allowed the repairs to accumulate. Mr. Hogg expressed the opinion that during the past twelve months the Committee had been at fault in not carrying out the recommendations of the previous Engineer (Mr. F. M. Harris) in regard to repairs. When Mr. Harris asked for these to be done, the Committee said: "Leave it until Mr. Porter's report has been received;" and when this came, they took some time to consider it. Then they discharged their Engineer, and said they would let things remain until the new one came. He mentioned this to show that the former Engineer was not at fault, for he put down £600 in his estimate for new retorts, and the Committee cut it down to £300. The extra money they were now asked to spend ought to have been laid out years before. They had been too careful—too cheeseparing about it. Mr. Lee said the Committee waited for Mr. Porter's report, and then did not do what he asked them.

New Joint-Stock Companies.—The Dinnington and District Gas Company, Limited, has been registered with a capital of £12,000, in £1 shares, with the object set out in the title. The Bacterial Water Purification Company, Limited, has been registered with a capital of £2000, in £1 shares.

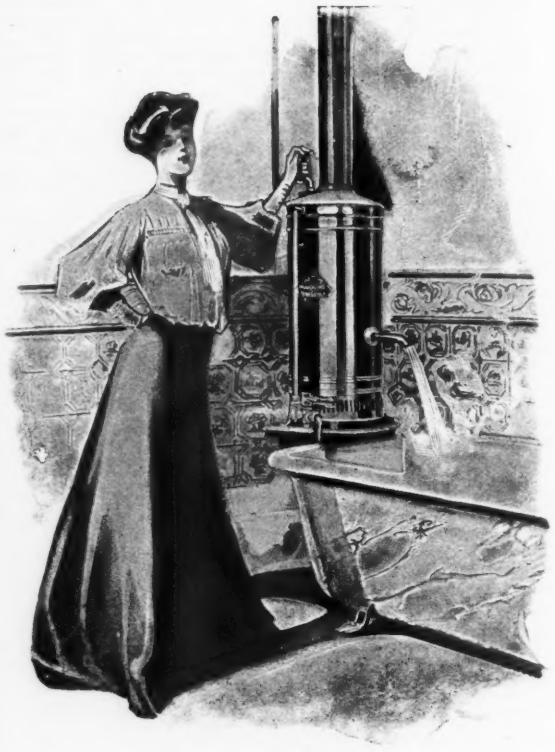
Coventry Water Supply.—The water undertaking of the Coventry Corporation has had a most successful year; the balance-sheet for the twelve months ending March 31 last showing a profit of £6405, against a surplus in the previous year of £3225. It is proposed to pay over to the borough fund £4500 in relief of the rates. Last year £4000 was transferred; this amount being made up by a grant from the reserve fund.

Reductions in Price.—The Salford Borough Council last Wednesday approved and adopted the recommendation of the Gas Committee to reduce the price of gas to consumers by ordinary meter by 3d. per 1000 cubic feet, and to allow prepayment meter users 30 instead of 28 cubic feet of gas for 1d. The Haywards Heath Gas Company have, owing to the moderation in the coal prices, reduced the price of gas by 3d. per 1000 cubic feet.

Monmouthshire Water Supply.—As the result of the rejection of the Monmouthshire Water Bill by the House of Lords Committee, it has been decided, at a special Committee meeting of the Abercarn District Council, to invite the Abertillery, Risca, Mynyddislwyn, Abersychan, Pontypool, and Blaenavon Councils to appoint representatives to a conference at Newport, for the purpose of considering the advisability of forming a Water Board.

Further New Issues of Gas and Water Capital.—The Directors of the Tottenham and Edmonton Gas Company are inviting tenders for £25,000 of "B" consolidated stock. It is the first issued portion of the additional capital authorized by the Company's Act of 1906; and it is offered at a minimum price of £107 per £100 of stock. Tenders are to be in by 5 p.m. on Monday, the 6th prox. Our readers will see that Messrs. A. & W. Richards have been instructed by Directors to offer for sale, at the Mart, Tokenhouse Yard, E.C., next Tuesday, three new issues—viz., £2000 of 5 per cent. preference stock of the Falmouth Water Company, some additional £10 shares in the Haywards Heath District Gas Company, and £3000 of consolidated ordinary stock of the Chigwell, Loughton, and Woodford Gas Company. They will also invite biddings for £1250 of ordinary "C" stock of the Ilford Gas Company belonging to a private owner. On the 18th inst., Messrs. Geo. Nichols, Howes, Young, Alder, and Co., will offer for sale £20,000 of general capital stock (5 per cent.) and £8000 of new 4 per cent. debenture stock of the Bristol Gas Company—at a minimum price of £113 in the former and of £100 in the latter case.

WATER HEATING.



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Complete Catalogue, &c., from the

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Stour St., Spring Hill, Birmingham.

OR

58, Finsbury Pavement, LONDON, E.C.

Rio de Janeiro Water Supply.—The water supply of Rio de Janeiro, Brazil, is being increased from a present daily capacity of approximately 38·3 million gallons to substantially 53½ million gallons, by extensive improvements involving an expenditure of nearly £1,800,000. Rio de Janeiro is in a district similar to that of Columbia, and the water supply is provided by the Federal Government. The present works include eleven separate stations, in the hills near the city. The additional supply is also to be obtained from these hills, which are controlled by the Government, and ensure a large quantity of water quite satisfactory for domestic purposes.

Progress of the Gunning System of Automatic Street Lighting.—Evidence has just been afforded of the rapid progress that is being made in automatic street lighting by the above-named system. In the course of one week, the Oldham Corporation, who have had 150 "Gunfire" controllers in use two years, decided to extend the system to a further 500 lamps; while the Banbury Gas Company determined on installing it in the whole of their lamps, the Inverness Corporation in 100 of theirs, and the Bristol Corporation in the lamps in two lamplighters' rounds. We are informed that large orders have been received for the installation of the system in several towns in France, Italy, and Spain.

New Water Supply for Totnes.—An additional water supply for Totnes was inaugurated on Thursday week, when members of the Corporation and the officials met at the spring at Follaton, and the supply was turned into the town from the collecting-tank. Alderman T. C. Kellock, the Chairman of the Water Committee, performed the ceremony, and expressed the opinion that in acquiring this additional supply the Corporation had taken one of the most important steps in the interest of the town which he had witnessed in his lifetime. The new supply has been obtained on a lease of 99 years at a rental of £100 per annum; the Corporation being entitled to take 20,000 gallons of water a day from May to November. It is so situated that the water can be supplied by gravitation to the highest point of the town, or stored in any of the reservoirs.

Staffordshire Potteries Water-Works Company.—The annual meeting of this Company was held at Hanley on May 27—Mr. J. Maddocks presiding. The report showed that the water revenue was £60,425—an increase of £905; and the profit on the revenue account was £30,704. After providing for the interim dividend, there remained a balance of £16,228, which the Directors recommended should be appropriated as follows: Payment of dividend at the rate of 9½ per cent. on the consolidated ordinary stock (free of income-tax), making 9½ per cent. for the year, and payment of a dividend of 7 per cent. on the consolidated new ordinary stock (less income-tax), making 7 per cent. for the year—leaving a balance of £1665 for transfer to the depreciation and contingent fund account. In moving the adoption of the report, the Chairman congratulated the shareholders upon its satisfactory character, but reminded them that they must not always expect to keep up the high-water mark of last year. They were not only providing water for their own district, but were also supplying other districts outside their parliamentary area, which all went to swell the total capital outlay and return in the way of increased revenue. The motion was carried; and the dividends recommended were declared.

Reduction in Price at New Mills.—The New Mills Urban District Council have decided to make another reduction of 1½d. per 1000 cubic feet in the price of gas, bringing the figure down to 2s. 9d., as compared with 4s. 10d. in the days of the Gas Company. They will also borrow £2000 for further extensions.

Price of Gas at Bury.—The Gas Committee of the Bury Town Council have further considered the question of the price of gas, and have decided that the gross price shall be the same as last year—2s. 3d. per 1000 cubic feet (and not 1d. less, as mentioned last week); and that there shall be 1d. per 1000 feet allowed for prompt payment, and 2d. per 1000 feet share of profits. This will make the net price 2s. per 1000 cubic feet, against 1s. 11d. last year. It is estimated that, as a result of this, the profit for the present year will be £6000, instead of £4000.

Theft of Gas at Thornton Heath.—At the Croydon Borough Police Court recently, Edward Thomas Brown, a plumber, living at No. 57, Gillett Road, Thornton Heath, pleaded guilty to feloniously taking a supply of gas from the pipes of the Croydon Gas Company. Accused had his supply by a prepayment meter, and he made the usual surreptitious connection with a piece of tubing. Mr. R. J. Clark, who prosecuted on behalf of the Company, said they did not wish to press the case; but they had to take these proceedings in order to deter other possible offenders. As the accused related some extenuating circumstances, the Magistrates thought a fine of 10s., including costs, would meet the case.

Honley Gas Undertaking.—Mr. H. Marsden, the Manager of the Honley Gas-Works, in his report on the past year's working, says that 27,099,800 cubic feet of gas were manufactured, against 25,363,000 cubic feet in the previous year, an increase of 1,736,800 cubic feet, or 6·8 per cent. The unaccounted-for gas was 2,436,000 cubic feet, or 8·9 per cent., against 9 per cent. There were 49 new consumers added; and the number of meters now in use is 1434. During the year 2817 tons of coal were used, equal to 9620 cubic feet per ton of coal, as against 9534 cubic feet; and the sale was 8625 cubic feet per ton, against 8551 feet. Coal cost 9s. 7½d. per ton, against 8s. 1½d. The total expenditure was £3612, against £3286, or an increase of £326. The income was £4804, against £4661, an increase of £143, which would have amounted to £150 more, but for the increased discounts allowed during the year. The gross profit is £1191, against £1375.

Messrs. Biggs, Wall, and Co., are to supply and erect one of their "Rapid" manual-charging machines at the Newport (Isle of Wight) Gas-Works.

At a Trades Exhibition now being held at Burton-upon-Trent, the Lucas system of incandescent gas lighting is in use at a number of the stalls; a "Thermopile" lamp being shown which, with a consumption of no more than 33 cubic feet per hour, costing 1d., gives the light of 1200 candles. Gas cooking-stoves similar to those let on hire by the Corporation are shown at one of the stands; and in the lecture-room Miss Reay uses a Fletcher stove for giving cookery demonstrations. The gas lighting and stove fitting work at the exhibition was carried out by Mr. Newman, the outdoor foreman to the Gas Committee.

"ILLUMINATING TRUTHS."

LEAFLETS FOR DISTRIBUTION.

No. 1.—"The Sanitary Aspects of Gas and Electric Lighting."
No. 2.—"The Cleanliness of Illuminants: The Eyesight."
No. 3.—"Fire Risks."
No. 4.—"The Relative Cost of Gas and Electricity, and Matters affecting it."
No. 5.—"On Reliability, with Instances of Misplaced Confidence."
No. 6.—"On Shop Lighting, with Special Reference to the Flame Arc Lamp.'
No. 7.—"The Osram Lamp: Fiction and Fact."

This series of Leaflets will be useful, not only for distribution among Householders generally, but for circulation among Shareholders to fortify them with arguments defence of the commodity in which they have invested capital. Copies of each Leaflet should also be kept in every Gas Undertaking's Show-Rooms.

Prices for Quantities on Application to WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situation Vacant.

TRAVELLER. No. 4952.
STOKER. Biggleswade Gas Works.

Situations, &c., Wanted.

REPRESENTATION (GAS PLANT FIRM). No. 4945.
SECRETARYSHIP. A. L. Griffith, 46, Queen Victoria Street, E.C.

Plant (Second-Hand), &c., for Sale.

CONDENSERS, ENGINES AND EXHAUSTERS, SCRUBBERS, PURIFIERS, RETORT-HOUSE FITTINGS, &c. Ellis, Etruria Works, near Stoke.
ENGINES AND DYNAMOS, &c. No. 4951.
PLANT, MACHINERY, &c. (LAMP MANUFACTURERS). Anderson and Duffield, Slough.
PURIFIER VALVES. Malton Gas Company.
TESTING APPARATUS AND TECHNICAL JOURNALS. Executors of the late Mr. F. H. Leeds, Bridport.

Patents for Disposal or Licences to Work.

VALVES, &c. Haseltine, Lake, and Co., Southampton Buildings, W.C.

Meetings.

INSTITUTION OF GAS ENGINEERS. June 16 to 18.

Capital Wanted. No. 4946.

Stocks and Shares.

BRISTOL GAS COMPANY. June 18.
CHIGWELL, LOUGHTON, AND WOODFORD GAS COMPANY. June 16.
FALMOUTH WATER COMPANY. June 16.
HAYWARDS HEATH GAS COMPANY. June 16.
ILFORD GAS COMPANY. June 16.
MELTON MOWBRAY GASLIGHT AND COKE COMPANY. June 23.

TENDERS FOR

Benzol.

HEYWOOD GAS DEPARTMENT. Tenders by June 23.

Coal and Cannel.

AUDLEY URBAN DISTRICT COUNCIL. Tenders by June 17.
BAKEWELL GAS DEPARTMENT. Tenders by June 25.
BARRY GAS DEPARTMENT. Tenders by June 20.
BLACKPOOL GAS DEPARTMENT. Tenders by June 29.
BURTON LATIMER GAS COMPANY. Tenders by June 20.
DEWSBURY CORPORATION. Tenders by June 20.
DROITWICH GAS DEPARTMENT. Tenders by June 22.
DUDLEY GASLIGHT COMPANY. Tenders by June 15.
EVESHAM GAS DEPARTMENT. Tenders by June 22.
GODSTONE UNION. Tenders by June 22.
ISLE OF THANET GAS COMPANY. Tenders by June 18.
LEAMINGTON PRIORS GAS COMPANY. Tenders by June 16.
PAIGNTON GAS COMPANY. Tenders by June 13.
PONTYPRIDD GAS DEPARTMENT. Tenders by June 22.
RHYL GAS DEPARTMENT. Tenders by June 17.
SALISBURY GAS COMPANY. Tenders by June 12.
SHREWSBURY GAS COMPANY. Tenders by June 13.
SUNBURY GAS COMPANY. Tenders by June 18.
TORQUAY GAS DEPARTMENT. Tenders by June 22.

Cookers, &c.

PONTYPRIDD GAS DEPARTMENT. Tenders by June 22.

Fire-Clay Goods, &c.

PONTYPRIDD GAS DEPARTMENT. Tenders by June 22.

General Stores (Sulphuric Acid, Lead Pipe, Barrows, Tools, Oils, Brass Fittings, &c.).

PONTYPRIDD GAS DEPARTMENT. Tenders by June 22.

Lamps and Mantles.

PONTYPRIDD GAS DEPARTMENT. Tenders by June 22.

Meters.

PONTYPRIDD GAS DEPARTMENT. Tenders by June 22.

Pipes, &c.

PONTYPRIDD GAS DEPARTMENT. Tenders by June 22.

Tar and Liquor, &c.

BAKEWELL GAS DEPARTMENT. Tenders by June 25.
GREAT WESTERN RAILWAY. Tenders by June 23.
FENTON GAS DEPARTMENT. Tenders by June 18.
LONGTON GAS DEPARTMENT. Tenders by June 23.
NEWARK GAS COMPANY. Tenders by June 18.
OLDHAM GAS DEPARTMENT. Tenders by June 23.
PONTYPRIDD GAS DEPARTMENT. Tenders by June 22.
READING GAS COMPANY. Tenders by June 22.

The Colchester Corporation have been served with a writ in an action commenced in the King's Bench Division by Mr. A. J. Hollington and Messrs. Hollington Bros. The action relates to alleged vibration at the electricity works; and the Town Clerk has been instructed to enter an appearance on behalf of the Council.

The Newport (Mon.) Gas Company a short time ago invited the Corporation Electricity Committee to take part in a trial made by competent independent lighting experts to compare, under such conditions as might be agreed upon, the relative values for public lighting of incandescent gas-lamps and incandescent electric lamps. But the Corporation do not think it necessary to take part in such a test.

Having fully considered the question of acquiring the Lisburn Gas-Works, the Urban District Council are of opinion that it would be in the best interests of the town that the undertaking should be under the control of the Council; and they have resolved that the Chairman of the Company be asked to supply the Council with copies of their audited accounts for the past five years. The opinion was expressed that, in addition, the Company should make a proposal to the Council as to the terms on which the latter could acquire the works.

We have received from Moffat's Limited, of Farringdon Road, E.C., catalogue No. 5 for the present year, showing the Lucas incandescent self-intensive and thermopile lamps, the "K" inverted gas-burner, and the "Sydney" and "Stanley" inverted lamps, with examples of installations of the Lucas system of lighting. The catalogue contains 78 large quarto pages, effectively illustrated.

The Falkirk Corporation, on the advice of their Engineer and Manager, Mr. William Wilson, have decided to meet augmented consumption by increasing the productive capacity of their present retort-bench by altering seven through settings of eight into settings of twelve; the existing regenerators and furnaces not being disturbed. The settings of eight will be made into nines in the ordinary way, and an additional tier of three retorts will be put in, for which purpose the main arches will be taken down and rebuilt in a higher position, which, in this case, can be done without interfering with the level of the hydraulic main. The whole of the work has been placed in the hands of Messrs. Robert Dempster and Sons, Limited, of Elland, who have received instructions to raise the frames, &c., of their charging and discharging machinery, so as to suit the additional tier of retorts.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

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D. ANDERSON AND COMPANY,
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MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

INSURANCE—H. F. LAMSDEN, Insurance Broker (Established 1888), 19 & 21, Queen Victoria Street, London, E.C., quotes BOTTOM LONDON RATES FOR EMPLOYERS' LIABILITY UNDER THE NEW ACT. Collective Fidelity Guarantee and THIRD PARTY, INCLUDING DAMAGE CAUSED BY GAS EXPLOSION, Marine, Fire, and Loss of Profit in case of Fire. Motor-Car, Boilers, Engines, Lifts, Cranes, all classes of Machinery, and Plant. Payment of Trade Acceptances and Open Credits Guaranteed. Excess Bad Debt Policies fixed on the most favourable Terms.

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